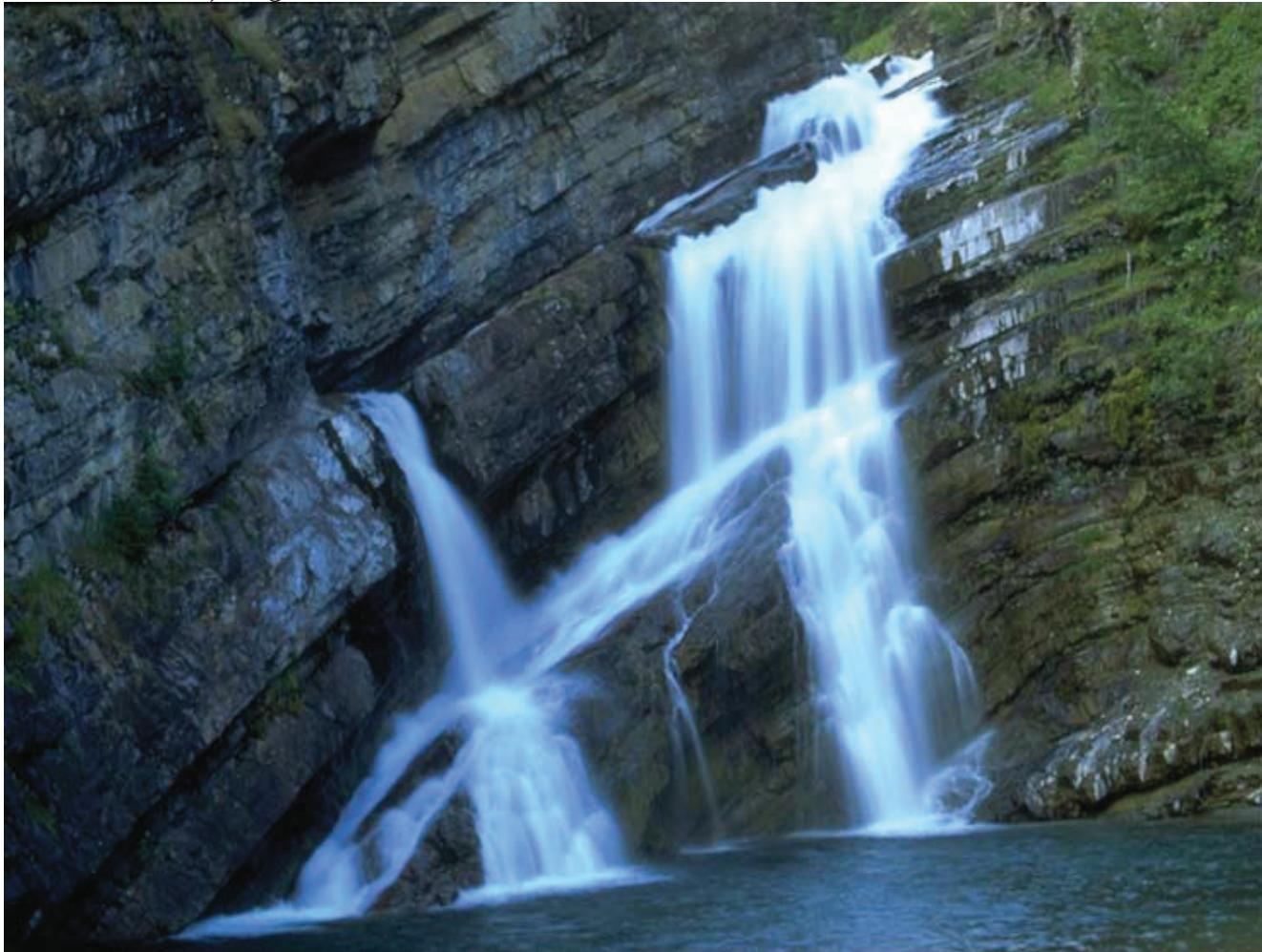


REMEDIATION WORK PLAN

MICHIGAN PLAZA
3801-3823 WEST MICHIGAN STREET
INDIANAPOLIS, INDIANA 46222
IDEM INCIDENT NO.: 0000198
IDEM VRP NO.: 6061202
MUNDELL PROJECT NO.: Mo1046
SEPTEMBER 18, 2013



110 South Downey Avenue
Indianapolis, Indiana 46219-6406
317-630-9060, fax 317-630-9065
www.MundellAssociates.com

APPENDIX C

AQUIFER HYDRAULIC TEST DATA

Table C-1

Slug Test Data Summary - March-April 2013
 Michigan Plaza
 3801-3823 West Michigan Street
 Indianapolis, Indiana
 MUNDELL Project No.: M01046

Field Test Type/ Well I.D.	HYDRAULIC CONDUCTIVITY, ft/day						
	MMW-P- 02	MMW-P- 11S	MMW-P- 11DR	MMW-P- 13S	MMW-P- 13D	MMW-P- 14S	MMW-P- 14D
Falling Head	33.5	32.9	85.0	57.4	52.0	93.0	67.1
Rising Head	44.4	38.9	130.3	99.6	22.1	141.1	84.4
Avg K-Value	39.0	35.9	107.6	78.5	37.0	117.0	75.8
							70.9
							70.1
							27.5

Note:

All analyses above utilized the Bower and Rice solution method for unconfined aquifers (Bouwer and Rice, 1976) as contained in the software AQTESOLV™.

Michigan Plaza Slug Testing Results

March-April 2013

Methodology

On March 29 and April 1, 2013, MUNDELL personnel performed aquifer characterization studies by conducting a series of slug tests at selected wells located between Michigan Plaza and the Cossell Road residences. Monitoring well MMW-P-02 along with shallow/deep well pairs MMW-P-11S/DR, MMW-P-13S/D, and MMW-P-14S/D were evaluated. At each well, the well was opened and allowed to equilibrate for a period of 20 minutes. An In-Situ Inc. Level TROLL® 700 pressure transducer that records elapsed time and water level elevation was then placed into the well and the water level was then allowed to re-equilibrate. The TROLL® was connected to a hand-held In-Situ Inc. RuggedReader® Handheld PC device that controls test initiation and allowed monitoring of water level response data. Slug tests were set up to record response of water level displacement on a logarithmic time scale at intervals of about 3 readings per second at the start of the test, with progressively longer intervals based on a logarithmically decaying schedule as the test progresses. To begin each test, an inert solid PVC slug with dimensions of approximately 3 feet long by 1.25 inches in diameter (for an equivalent displacement volume of about 0.0255 ft³) was rapidly lowered into the well to displace the water column. Measurements of the falling water level over time (falling head test) were recorded until approximately 95% recovery was attained. The test was stopped and a new test was begun when water levels returned to the approximate original static position. The test was repeated by removing the slug and recording “rising head” data over time. Between each monitoring well slug test, the Level TROLL® and water level meter were properly decontaminated.

Analyses of Field Data

Hydraulic conductivity values were calculated for each test by processing rising and falling water level data using the AQTESOLV™ software, created by HydroSOLVE, Inc. The Bouwer and Rice Method (1976) curve matching solution for partially penetrating wells was utilized. Based on the tests, K-values range between 22.1 and 141.1 ft/day, with an overall average K-value of 70.1 ft/day.

A summary of the testing results, along with the slug test results, are included within this appendix.

WELL TEST ANALYSIS

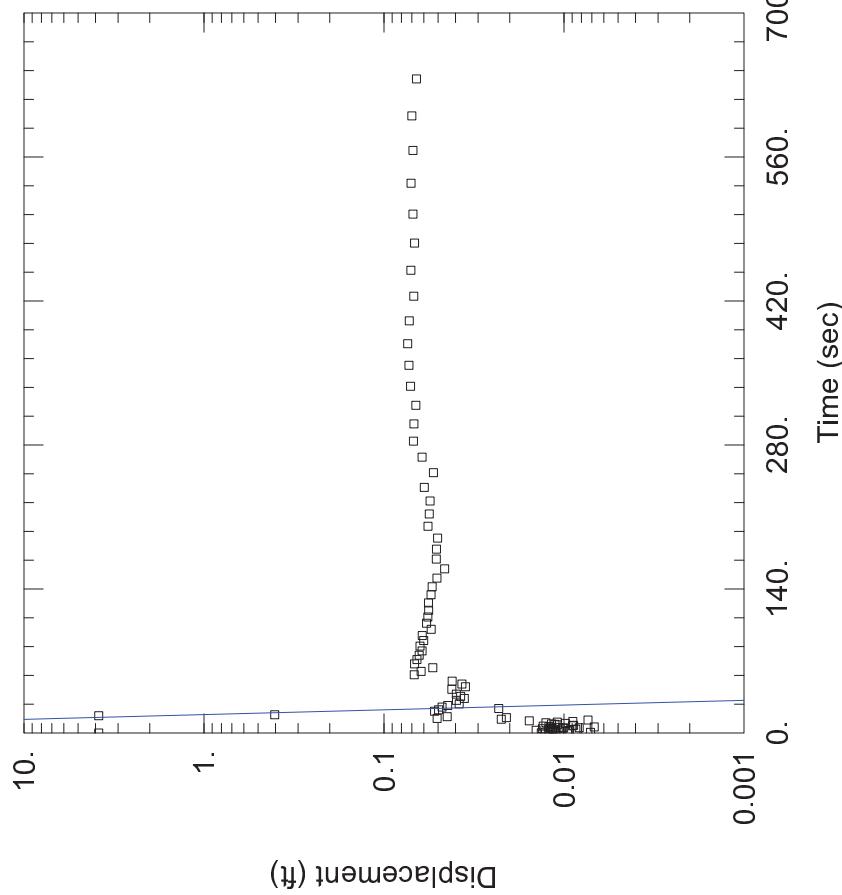
Data Set: T:\...\MMW-P-02 IN (B-R 1976).aqt
 Date: 04/10/13 Time: 16:32:12

PROJECT INFORMATION

Company: Mundell & Associates Inc.
 Client: AIMCO
 Project: M01046
 Test Well: MMW-P-02
 Test Date: 3-29-2013

SOLUTION

Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 $K = \frac{33.49}{7335.5} \text{ ft/day}$
 $y_0 = 700 \text{ ft}$

AQUIFER DATA

Anisotropy Ratio (K_z/K_r): 1.

Saturated Thickness: 20.13 ft

WELL DATA (MMW-P-02)

Static Water Column Height: 20.13 ft
 Screen Length: 10. ft
 Well Radius: 0.33 ft

Initial Displacement: 3.84 ft
 Total Well Penetration Depth: 10.63 ft
 Casing Radius: 0.083 ft

Data Set: T:\2001\M01046 Michigan Meadows Apts\Data\Slug Test Files\Slug Test 1976\MMW-P-02 IN (B-R 1976).aqt
 Date: 04/10/13
 Time: 16:32:28

PROJECT INFORMATION

Company: Mundell & Associates Inc.
 Client: AIMCO
 Project: M01046
 Test Date: 3-29-2013
 Test Well: MMW-P-02

AQUIFER DATA

Saturated Thickness: 20.13 ft
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MMW-P-02

X Location: 0. ft
 Y Location: 0. ft

Initial Displacement: 3.84 ft
 Static Water Column Height: 20.13 ft
 Casing Radius: 0.083 ft
 Well Radius: 0.33 ft
 Well Skin Radius: 0.33 ft
 Screen Length: 10 ft
 Total Well Penetration Depth: 10.63 ft

No. of Observations: 105

<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Observation Data</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>
0.25	0.01337		11.94	0.01559
0.5	0.01158		12.66	0.007344
0.75	0.007117		13.44	0.00223
1	0.01265		14.22	0.05062
1.25	0.01121		15.06	0.02085
1.5	0.01108		15.96	0.04448
1.75	0.01168		16.92	3.84
2	0.00955		17.88	0.4042
2.25	0.01108		18.96	-0.1717
2.5	0.009312		20.1	-0.07645
2.75	0.01426		21.3	0.05232
3	0.01122		22.56	0.04968
3.25	0.01136		23.88	0.02303
				0.05108
				178.8

AQTESOLV for Windows

<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>
3.5	0.01197	25.32	0.0475	189.6	0.05035
3.75	0.008592	26.82	0.04421	201.	0.05687
4.	0.01149	28.38	0.03816	213.	0.05602
4.25	0.01318	30.06	-0.02969	225.6	0.05542
4.5	0.01183	31.86	0.0395	238.8	0.05965
4.75	0.01016	33.72	0.03577	253.2	0.05312
5.	0.01002	35.76	0.03745	268.2	0.06143
5.251	0.008222	37.86	0.03962	283.8	0.06856
5.501	0.01076	40.08	-0.008469	300.6	0.06807
5.751	0.01183	42.48	0.04192	318.6	0.0665
6.001	0.006787	45.	0.03528	337.2	0.07116
6.36	0.0121	47.64	0.03685	357.6	0.07261
6.72	0.01304	50.46	0.04179	378.6	0.07382
7.14	0.008945	53.46	-0.01353	400.8	0.07224
7.56	0.008834	56.64	0.06782	424.8	0.06892
7.98	0.01088	60.	0.06217	450.	0.0708
8.46	0.01123	63.6	0.0535	476.4	0.06755
9.	0.01172	67.2	0.06761	504.6	0.069
9.48	0.009799	71.4	0.06553	534.6	0.07069
9.8	0.01258	75.6	0.06372	566.4	0.06894
10.08	0.01088	79.8	0.06143	600.	0.06991
10.68	0.00892	84.6	0.063	636.	0.06594
11.28					

SOLUTION

Slug Test
 Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 $\ln(Re/rw) = 2.262$

VISUAL ESTIMATION RESULTS

Estimated Parameters

<u>Parameter</u>	<u>Estimate</u>
K	$\frac{33.49}{7335.5}$ ft/day
y_0	

$$K = 0.01182 \text{ cm/sec}$$

$$T = K^* b = 674.2 \text{ ft}^2/\text{day} (7.25 \text{ sq. cm/sec})$$

WELL TEST ANALYSIS

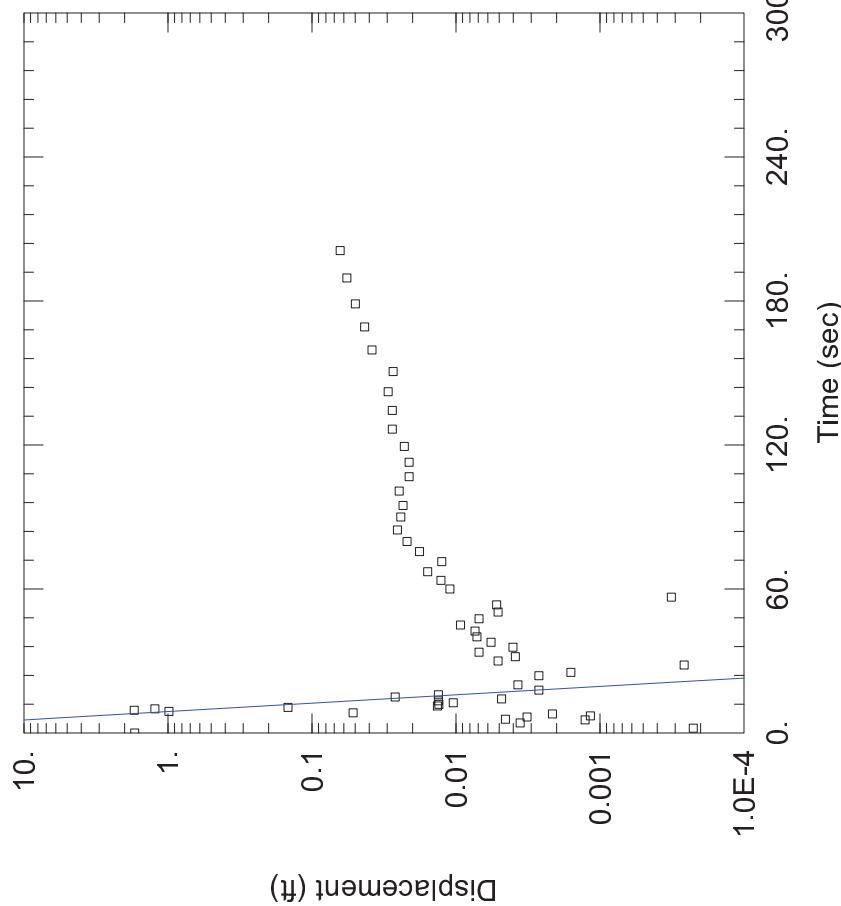
Data Set: T:\...\MMW-P-02 OUT (B-R 1976).aqt
 Date: 04/10/13 Time: 16:31:49

PROJECT INFORMATION

Company: Mundell & Associates Inc.
 Client: AIMCO
 Project: M01046
 Test Well: MMW-P-02
 Test Date: 3-29-2013

SOLUTION

Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 $K = \frac{44.42}{363.2} \text{ ft/day}$
 $y_0 = \frac{363.2}{363.2} \text{ ft}$

AQUIFER DATA

Anisotropy Ratio (K_z/K_r): 1.

Saturated Thickness: 20.13 ft

WELL DATA (MMW-P-02)

Static Water Column Height: 20.13 ft
 Screen Length: 10. ft
 Well Radius: 0.33 ft

Initial Displacement: 1.7 ft
 Total Well Penetration Depth: 10.63 ft
 Casing Radius: 0.083 ft

AQTESOLV for Windows

Data Set: T:\2001\M01046 Michigan Meadows Apts\Data\Slug Test Files\Slug Test 1976\MMW-P-02 OUT (B-R 1976).aqt
 Date: 04/10/13
 Time: 16:31:07

PROJECT INFORMATION

Company: Mundell & Associates Inc.
 Client: AIMCO
 Project: M01046
 Test Date: 3-29-2013
 Test Well: MMW-P-02

AQUIFER DATA

Saturated Thickness: 20.13 ft
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MMW-P-02

X Location: 0. ft
 Y Location: 0. ft

Initial Displacement: 1.7 ft
 Static Water Column Height: 20.13 ft
 Casing Radius: 0.083 ft
 Well Radius: 0.33 ft
 Well Skin Radius: 0.33 ft
 Screen Length: 10 ft
 Total Well Penetration Depth: 10.63 ft

No. of Observations: 85

<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Observation Data</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>
0.25	-0.003103	8.46	0.05177	0.009301	45.
0.5	-0.007002	9.	0.9833	0.006901	47.64
0.75	-0.005798	9.48	1.714	0.005091	50.46
1	-0.005666	10.08	1.233	0.005212	53.46
1.25	-0.004948	10.68	0.1468	0.000319	56.64
1.5	-0.00375	11.28	0.01345	0.011	60.
1.75	-0.008705	11.94	0.01313	0.01269	63.6
2	0.000225	12.66	0.01044	0.01572	67.2
2.25	-0.008119	13.44	0.01325	0.01255	71.4
2.5	-0.005338	14.22	0.004814	0.01789	75.6
2.75	-0.002539	15.06	0.02638	0.02187	79.8
3	-0.006428	15.96	0.01325	0.02548	84.6
3.25	-0.001491	16.92	-0.002299	0.02415	90.

AQTESOLV for Windows

<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>
3.5	-0.001856	17.88	0.002651	94.8	0.0233
3.75	-0.00401	18.96	-0.000374		0.02475
4.	-0.002686	20.1	0.00371		0.02114
4.25	0.003576	21.3	-0.001323		0.02114
4.5	-0.000771	22.56	-0.001568		0.02283
4.75	-0.003307	23.88	0.002651		0.02764
5.	-0.004133	25.32	0.00159		0.02764
5.251	-0.001491	26.82	-0.000374		0.02957
5.501	0.001268	28.38	0.00026		0.02728
5.751	0.00453	30.06	0.005091		0.03824
6.001	-0.000282	31.86	0.003865		0.04307
6.361	-0.000165	33.72	0.006901		0.04993
6.721	0.0003206	35.76	0.004016		0.05715
7.141	0.001165	37.86	0.005701		0.06365
7.56	-0.002334	40.08	0.007139		
7.98	0.002134	42.48	0.007375		

SOLUTION

Slug Test
 Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 In(Re/rw): 2.262

VISUAL ESTIMATION RESULTSEstimated Parameters

<u>Parameter</u>	<u>Estimate</u>	<u>ft/day</u>
K	44.42	ft
y_0	363.2	

$$K = 0.01567 \text{ cm/sec}$$

$$\frac{T}{T} = K^* b = 894.2 \text{ ft}^2/\text{day} (9.615 \text{ sq. cm/sec})$$

WELL TEST ANALYSIS

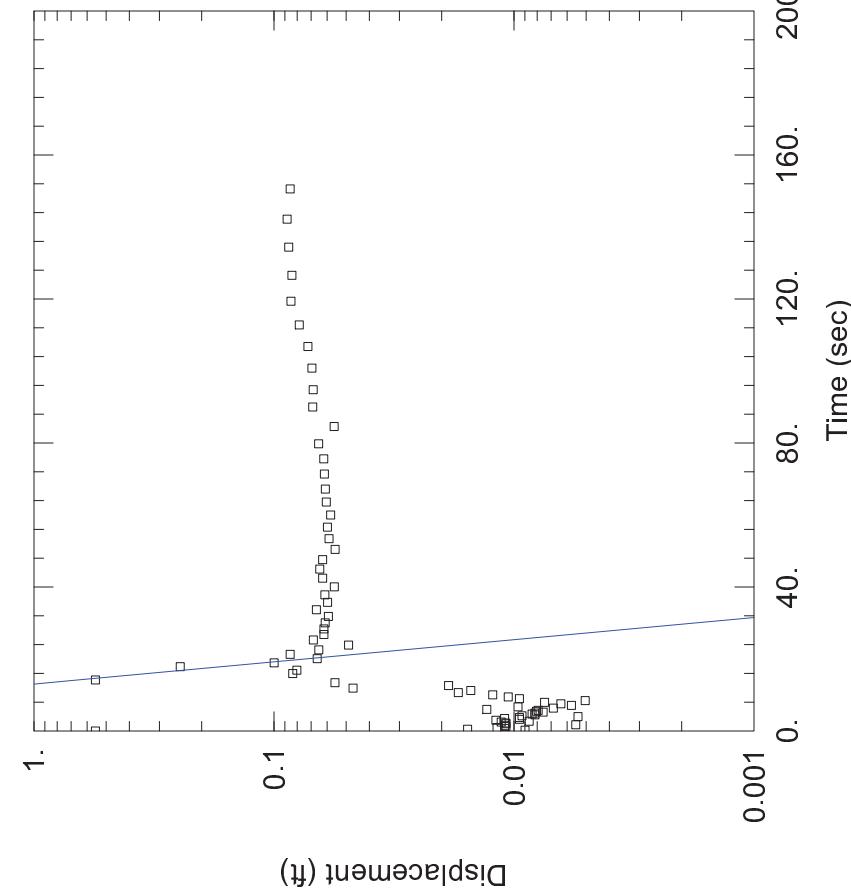
Data Set: T:\...\MMW-P-11S\IN(RUN 3)(B-R 1976).aqt
 Date: 04/10/13 Time: 16:37:34

PROJECT INFORMATION

Company: Mundell & Associates Inc.
 Client: AIMCO
 Project: M01046
 Test Well: MMW-P-11S
 Test Date: 3-29-2013

SOLUTION

Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 $K = \frac{32.9}{132.4} \text{ ft/day}$
 $y_0 = 16.17 \text{ ft}$

AQUIFER DATA

Anisotropy Ratio (K_z/K_r): 1.

Saturated Thickness: 16.17 ft

WELL DATA (MMW-P-11S)

Initial Displacement: 0.5545 ft
 Total Well Penetration Depth: 6.17 ft
 Casing Radius: 0.083 ft
 Static Water Column Height: 16.17 ft
 Screen Length: 6.17 ft
 Well Radius: 0.33 ft

Date: 04/10/13
Time: 16:37:19

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO
Project: M01046
Test Date: 3-29-2013
Test Well: MMW-P-11S

AQUIFER DATA

Saturated Thickness: 16.17 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MMW-P-11S

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 0.5545 ft
Static Water Column Height: 16.17 ft
Casing Radius: 0.083 ft
Well Radius: 0.33 ft
Well Skin Radius: 0.33 ft
Screen Length: 6.17 ft
Total Well Penetration Depth: 6.17 ft

No. of Observations: 80

<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Observation Data</u>	<u>Displacement (ft)</u>
0.251	0.008993	7.561	0.00637	0.05973
0.501	0.01561	7.981	0.007456	0.06129
0.751	0.01092	8.461	0.005047	0.05602
1.001	0.01176	9.001	0.00948	0.06264
1.251	0.01079	9.481	0.01056	0.06444
1.501	0.01092	1.08	0.01225	0.06264
1.751	0.005527	1.68	0.01705	0.05555
2.001	0.01081	1.128	0.01512	0.0589
2.251	0.01081	1.194	0.0468	0.05985
2.501	0.01129	12.66	60.	0.05805
2.751	0.008638	13.44	0.05568	0.06046
3.001	0.01188	14.22	0.5545	0.06105
3.251	0.00948	15.06	-0.2492	0.06164

AQTESOLV for Windows

<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>
3.501	0.01094	15.96	0.08352	75.6	0.062
3.751	0.00948	16.92	0.08017	79.8	0.06512
4.001	0.005408	17.88	0.2455	84.6	0.05613
4.251	0.009253	18.96	0.09971	90.	0.06896
4.501	0.008174	20.1	0.06598	94.8	0.06859
4.751	0.008401	21.3	0.08556	100.8	0.06945
5.001	0.008174	22.56	0.06504	106.8	0.07221
5.251	0.007562	23.88	0.04885	112.8	0.07843
5.501	0.008044	25.32	0.06851	119.4	0.08493
5.751	0.007927	26.82	0.06191	126.6	0.08417
6.001	0.01297	28.38	0.06119	134.4	0.08682
6.361	0.006848	30.06	0.06118	142.2	0.08814
6.721	0.00961	31.86	0.05926	150.6	0.08561
7.141	0.00576	33.72	0.06649		

SOLUTION

Slug Test
 Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 $\ln(Re/rw) = 1.823$

VISUAL ESTIMATION RESULTSEstimated Parameters

<u>Parameter</u>	<u>Estimate</u>	<u>ft/day</u>
K	32.9	
y_0	132.4	ft

$$K = 0.01161 \text{ cm/sec}$$

$$T = K^* b = 532. \text{ ft}^2/\text{day} \quad (5.721 \text{ sq. cm/sec})$$

WELL TEST ANALYSIS

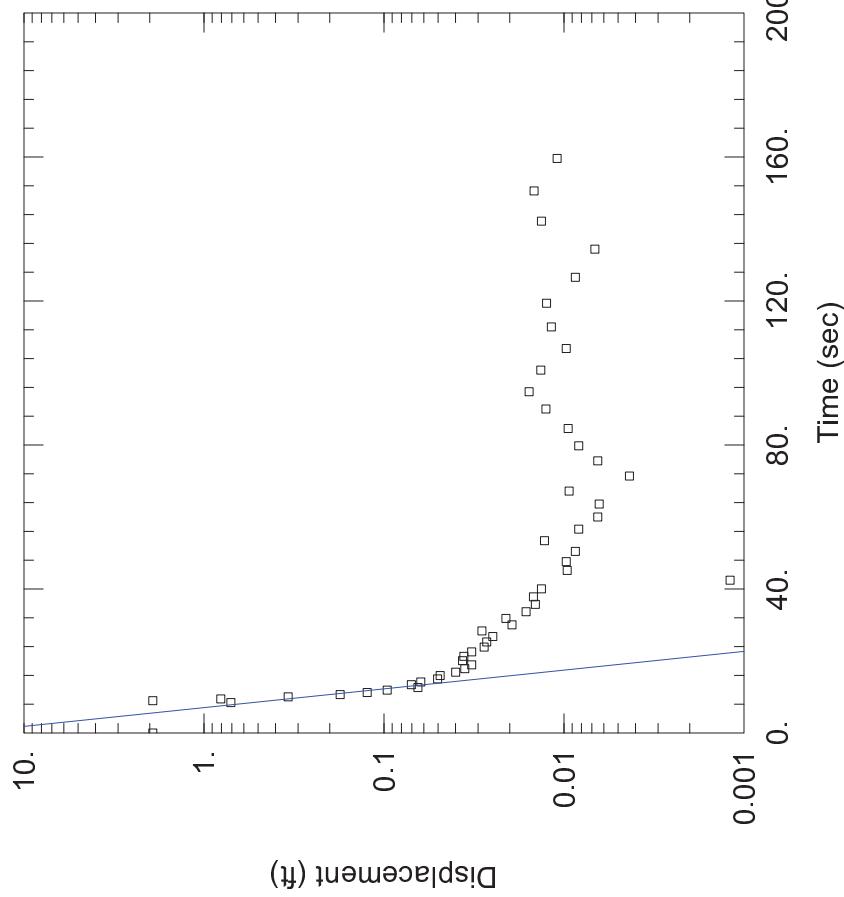
Data Set: T:\...\MMW-P-11S OUT (RUN 2) (B-R 1976).aqt
 Date: 04/10/13 Time: 16:41:23

PROJECT INFORMATION

Company: Mundell & Associates Inc.
 Client: AIMCO
 Project: M01046
 Test Well: MMW-P-11S
 Test Date: 3-29-2013

SOLUTION

Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 $K = \frac{38.88}{22.55} \text{ ft/day}$
 $y_0 = 22.55 \text{ ft}$

AQUIFER DATA

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (MMW-P-11S)

Initial Displacement: 1.923 ft
 Total Well Penetration Depth: 6.17 ft
 Casing Radius: 0.083 ft
 Static Water Column Height: 16.17 ft
 Screen Length: 6.17 ft
 Well Radius: 0.33 ft

Date: 04/10/13
Time: 16:41:39

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO
Project: M01046
Test Date: 3-29-2013
Test Well: MMW-P-11S

AQUIFER DATA

Saturated Thickness: 16.17 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MMW-P-11S

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 1.923 ft
Static Water Column Height: 16.17 ft
Casing Radius: 0.083 ft
Well Radius: 0.33 ft
Well Skin Radius: 0.33 ft
Screen Length: 6.17 ft
Total Well Penetration Depth: 6.17 ft

No. of Observations: 81

<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Observation Data</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>
0.25	-0.01164	7.561	-0.01356	35.76	0.01441
0.5	-0.01307	7.98	-0.01403	37.86	0.01478
0.75	-0.01247	8.461	0.7083	40.08	0.01334
1	-0.0085	9.	1.923	42.48	0.001193
1.25	-0.01511	9.48	0.8051	45.17	0.009592
1.5	-0.01093	10.08	0.3407	47.64	0.009715
1.75	-0.01285	10.68	0.1751	50.46	0.008645
2	-0.0126	11.28	0.1237	53.46	0.01283
2.25	-0.01248	11.94	0.09599	56.64	0.008275
2.5	-0.01381	12.66	0.06467	60.	0.006448
2.75	-0.01163	13.44	0.07033	63.6	0.006368
3	-0.0126	14.22	0.0624	67.2	0.009352
3.25	-0.009962	15.06	0.05027	71.4	0.004325

AQTESOLV for Windows

<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>
3.5	-0.01427	15.96	0.04872	75.6	0.00648
3.75	-0.01237	16.92	0.03995	79.8	0.008275
4.	-0.01104	17.88	0.03552	84.6	0.00948
4.25	-0.01151	18.96	0.03252	90.	0.0126
4.5	-0.01525	20.1	0.0366	94.8	0.01559
4.75	-0.01166	21.3	0.03599	100.8	0.01344
5.	-0.01346	22.56	0.03252	106.8	0.009706
5.251	-0.007694	23.88	0.02771	112.8	0.01175
5.501	-0.01321	25.32	0.02687	119.4	0.01248
5.751	-0.01273	26.82	0.02485	126.6	0.008645
6.001	-0.01032	28.38	0.02856	134.4	0.006734
6.361	-0.01094	30.06	0.01944	142.2	0.01334
6.721	-0.01058	31.86	0.021	150.6	0.01464
7.141	-0.01081	33.72	0.01622	159.6	0.01091

SOLUTION

Slug Test
 Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 $\ln(Re/rw) = 1.823$

VISUAL ESTIMATION RESULTSEstimated Parameters

<u>Parameter</u>	<u>Estimate</u>	<u>ft/day</u>
K	38.88	
y_0	22.55	ft

$$K = 0.01371 \text{ cm/sec}$$

$$T = K^* b = 628.6 \text{ ft}^2/\text{day} (6.759 \text{ sq. cm/sec})$$

WELL TEST ANALYSIS

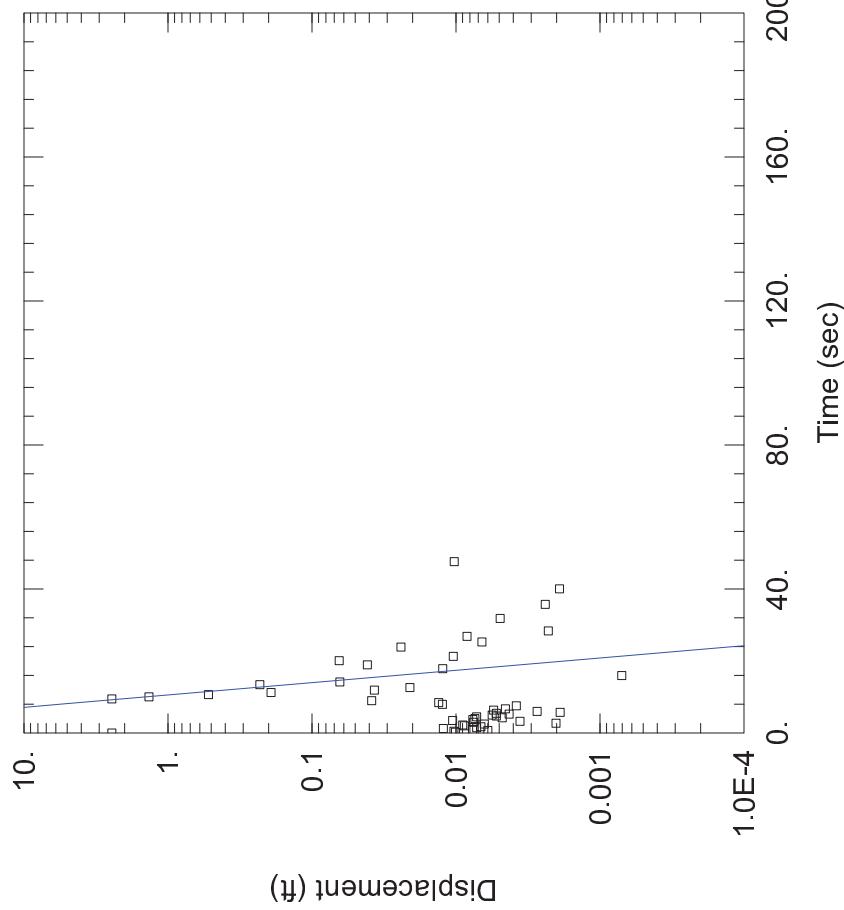
Data Set: T:\...\MMW-P-11DR IN (B-R 1976).aqt
 Date: 04/10/13 Time: 16:40:24

PROJECT INFORMATION

Company: Mundell & Associates Inc.
 Client: AIMCO
 Project: M01046
 Test Well: MMW-P-11DR
 Test Date: 3-29-2013

SOLUTION

Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 $K = \frac{84.96}{1219.1} \text{ ft/day}$
 $y_0 = 1219.1 \text{ ft}$

AQUIFER DATA

Anisotropy Ratio (Kz/Kr): 1.

Saturated Thickness: 16.97 ft

WELL DATA (MMW-P-11DR)

Initial Displacement: 2.452 ft
 Total Well Penetration Depth: 13.97 ft
 Casing Radius: 0.083 ft
 Static Water Column Height: 16.97 ft
 Screen Length: 5 ft
 Well Radius: 0.33 ft

Data Set: T:\2001\M01046 Michigan Meadows Apts\Data\Slug Test Files\Slug Test IN (B-R 1976).aqt
 Date: 04/10/13
 Time: 16:40:05

PROJECT INFORMATION

Company: Mundell & Associates Inc.
 Client: AIMCO
 Project: M01046
 Test Date: 3-29-2013
 Test Well: MMW-P-11DR

AQUIFER DATA

Saturated Thickness: 16.97 ft
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MMW-P-11DR

X Location: 0. ft
 Y Location: 0. ft

Initial Displacement: 2.452 ft
 Static Water Column Height: 16.97 ft
 Casing Radius: 0.083 ft
 Well Radius: 0.33 ft
 Well Skin Radius: 0.33 ft
 Screen Length: 5. ft
 Total Well Penetration Depth: 13.97 ft

No. of Observations: 73

<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Observation Data</u>	
		<u>Time (sec)</u>	<u>Displacement (ft)</u>
0.251	0.01008	6.721	0.004525
0.501	0.01032	7.141	-0.000123
0.751	0.006003	7.561	0.003803
1.001	0.007665	7.981	0.01243
1.251	0.01222	8.461	0.01317
1.501	0.007183	9.001	0.03848
1.751	0.006701	9.481	2.452
2.001	0.008735	10.08	1.355
2.251	0.008967	10.68	0.5223
2.501	0.006344	11.28	0.1922
2.751	0.002017	11.94	0.0368
3.001	0.007533	12.66	0.02084
3.251	0.003585	13.44	0.2302

AQTESOLV for Windows

<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>
3.501	0.01053	14.22	0.064	60.	-0.008845
3.751	0.007643	15.06	-0.03358	63.	-0.005261
4.001	0.007386	15.96	0.00705	67.	-0.01399
4.251	0.004772	16.92	-0.006727	71.	-0.01652
4.501	0.007179	17.88	0.01235	75.	-0.01482
4.751	0.005241	18.96	0.04125	79.	-0.01423
5.001	0.005604	20.1	0.06473	84.	-0.01521
5.251	0.004276	21.3	0.01044	90.	-0.01999
5.501	0.005241	22.56	-0.01221	94.	-0.02118
5.751	0.001887	23.88	0.0241	100.	-0.02766
6.001	0.002733	25.32	0.006591		
6.361	0.005479	26.85	0.008368		

SOLUTION

Slug Test
 Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 $\ln(Re/rw) = 0$.

VISUAL ESTIMATION RESULTSEstimated Parameters

<u>Parameter</u>	<u>Estimate</u>	
K	84.96	ft/day
y_0	1219.1	ft

$$K = 0.02997 \text{ cm/sec}$$

$$T = K^* b = 1441.7 \text{ ft}^2/\text{day} (15.5 \text{ sq. cm/sec})$$

WELL TEST ANALYSIS

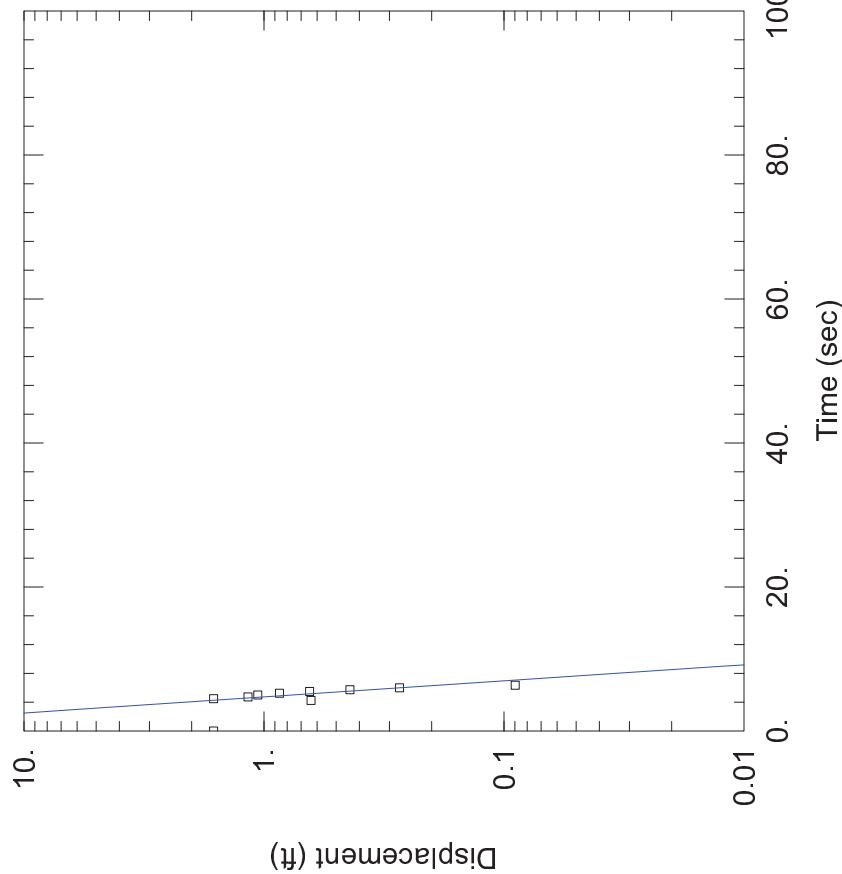
Data Set: T:\...\MMW-P-11DR OUT (B-R 1976).aqt
 Date: 04/10/13 Time: 16:38:54

PROJECT INFORMATION

Company: Mundell & Associates Inc.
 Client: AIMCO
 Project: M01046
 Test Well: MMW-P-11DR
 Test Date: 3-29-2013

SOLUTION

Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 $K = 130.3 \text{ ft/day}$
 $y_0 = 132.7 \text{ ft}$

AQUIFER DATA

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (MMW-P-11DR)

Static Water Column Height: 16.97 ft
 Screen Length: 5 ft
 Well Radius: 0.33 ft

Saturated Thickness: 16.97 ft

Initial Displacement: 1.621 ft
 Total Well Penetration Depth: 13.97 ft
 Casing Radius: 0.083 ft

Date: 04/10/13
Time: 16:38:38

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO
Project: M01046
Test Date: 3-29-2013
Test Well: MMW-P-11DR

AQUIFER DATA

Saturated Thickness: 16.97 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MMW-P-11DR

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 1.621 ft
Static Water Column Height: 16.97 ft
Casing Radius: 0.083 ft
Well Radius: 0.33 ft
Well Skin Radius: 0.33 ft
Screen Length: 5. ft
Total Well Penetration Depth: 13.97 ft

No. of Observations: 72

Time (sec)	Displacement (ft)	Observation Data	
		Time (sec)	Displacement (ft)
0.25	-0.1126	6.36	0.08968
0.5	-0.1113	6.72	-0.03156
0.75	-0.1113	7.14	-0.104
1.228	-0.1177	7.56	-0.1364
1.449	-0.1212	7.98	-0.1402
1.67	-0.1107	8.461	-0.136
2.043	-0.1189	9.9	-0.1248
2.264	-0.1098	9.48	-0.1164
2.485	-0.1121	10.08	-0.1135
2.705	-0.1113	10.68	-0.1129
2.926	-0.1124	11.28	-0.1154
3.146	-0.1081	11.94	-0.1111
3.366	-0.09571	12.66	-0.1183

Time (sec)	Displacement (ft)
25.32	-0.1171
26.82	-0.1193
28.38	-0.1194
30.06	-0.118
31.86	-0.119
33.72	-0.121
35.76	-0.1206
37.86	-0.1205
40.08	-0.1156
42.48	-0.1193
45.15	-0.1251
47.64	-0.1298
50.46	-0.1191

AQTESOLv for Windows

<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>
3.586	-0.1118	13.44	-0.1116	53.46	-0.1215
3.806	-0.117	14.22	-0.116	56.64	-0.1144
4.026	-0.03699	15.06	-0.1179	60.	-0.1191
4.246	0.6362	15.96	-0.1203	63.6	-0.1167
4.5	1.621	16.92	-0.1158	67.2	-0.1121
4.75	1.165	17.88	-0.1141	71.4	-0.1215
5.	1.061	18.96	-0.1189	75.6	-0.1163
5.25	0.8605	20.1	-0.1164	79.8	-0.1187
5.5	0.645	21.3	-0.1165	84.6	-0.1212
5.75	0.4382	22.56	-0.1168	90.	-0.1245
6.	0.2723	23.88	-0.1178	94.8	-0.1219

SOLUTION

Slug Test
 Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 $\ln(Re/rw) = 0.$

VISUAL ESTIMATION RESULTSEstimated Parameters

<u>Parameter</u>	<u>Estimate</u>	<u>ft/day</u>
K	130.3	
y_0	132.7	ft

$$K = 0.04598 \text{ cm/sec}$$

$$T = K^* b = 2211.7 \text{ ft}^2/\text{day} (23.78 \text{ sq. cm/sec})$$

WELL TEST ANALYSIS

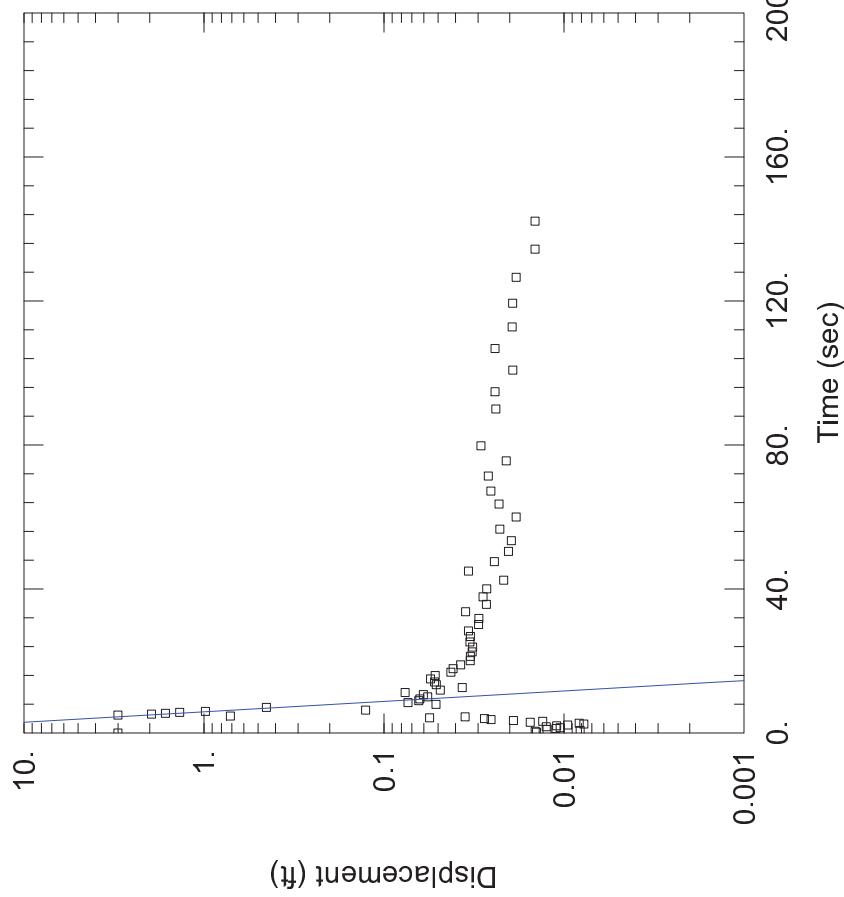
Data Set: T:\...\MMW-P-13S\IN (B-R 1976).aqt
 Date: 04/10/13 Time: 16:50:37

PROJECT INFORMATION

Company: Mundell & Associates Inc.
 Client: AIMCO
 Project: M01046
 Test Well: MMW-P-13S
 Test Date: 3-29-2013

SOLUTION

Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 $K = \frac{57.4}{106.6} \text{ ft/day}$
 $y_0 = 106.6 \text{ ft}$

AQUIFER DATA

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (MMW-P-13S)

Initial Displacement: 3.002 ft
 Total Well Penetration Depth: 8.86 ft
 Casing Radius: 0.083 ft
 Saturated Thickness: 15.86 ft
 Static Water Column Height: 15.86 ft
 Screen Length: 8.86 ft
 Well Radius: 0.33 ft

Data Set: T:\2001\M01046 Michigan Meadows Apts\Data\Slug Test Files\MMW-P-13S IN (B-R 1976).aqt
 Date: 04/10/13
 Time: 16:51:01

PROJECT INFORMATION

Company: Mundell & Associates Inc.
 Client: AIMCO
 Project: M01046
 Test Date: 3-29-2013
 Test Well: MMW-P-13S

AQUIFER DATA

Saturated Thickness: 15.86 ft
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MMW-P-13S

X Location: 0. ft
 Y Location: 0. ft

Initial Displacement: 3.002 ft
 Static Water Column Height: 15.86 ft
 Casing Radius: 0.083 ft
 Well Radius: 0.33 ft
 Well Skin Radius: 0.33 ft
 Screen Length: 8.86 ft
 Total Well Penetration Depth: 8.86 ft

No. of Observations: 79

<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Observation Data</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>
0.251	0.01421	7.561	-0.1045	35.76	0.02697
0.501	0.01444	7.981	0.05142	37.86	0.02817
0.751	0.00813	8.461	0.07351	40.08	0.02685
1.001	0.01241	9.001	0.06409	42.48	0.02162
1.251	0.01107	9.481	0.06313	45.	0.0339
1.501	0.0105	1.08	0.05717	47.64	0.02436
1.751	0.01254	1.68	0.06038	50.46	0.02031
2.001	0.01097	1.128	0.07624	53.46	0.01958
2.251	0.00953	1.194	0.04857	56.64	0.02271
2.501	0.007747	12.66	0.03675	60.	0.01841
2.751	0.008224	13.44	0.05119	63.6	0.02294
3.001	0.01539	14.22	0.05237	67.2	0.02544
3.251	0.01312	15.06	0.05512	71.4	0.02629

AQTESOLV for Windows

<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>
3.501	0.01907	15.96	0.05188	75.6	0.02092
3.751	0.02542	16.92	0.04249	79.8	0.0289
4.001	0.02765	17.88	0.04128	84.6	-0.0129
4.251	0.05571	18.96	0.03747	90.	0.02389
4.501	0.03542	20.1	0.03317	94.8	0.02414
4.751	0.7127	21.3	0.03306	100.8	0.01923
5.001	3.002	22.56	0.03235	106.8	0.02416
5.251	1.953	23.88	0.03213	112.8	0.01938
5.501	1.635	25.32	0.03333	119.4	0.01926
5.751	1.364	26.82	0.03306	126.6	0.01841
6.001	0.9806	28.38	0.0339	134.4	0.01447
6.361	0.1264	30.15	0.02982	142.2	0.01448
6.721	-0.1229	31.86	0.02971		
7.141	0.4501	33.72	0.03518		

SOLUTION

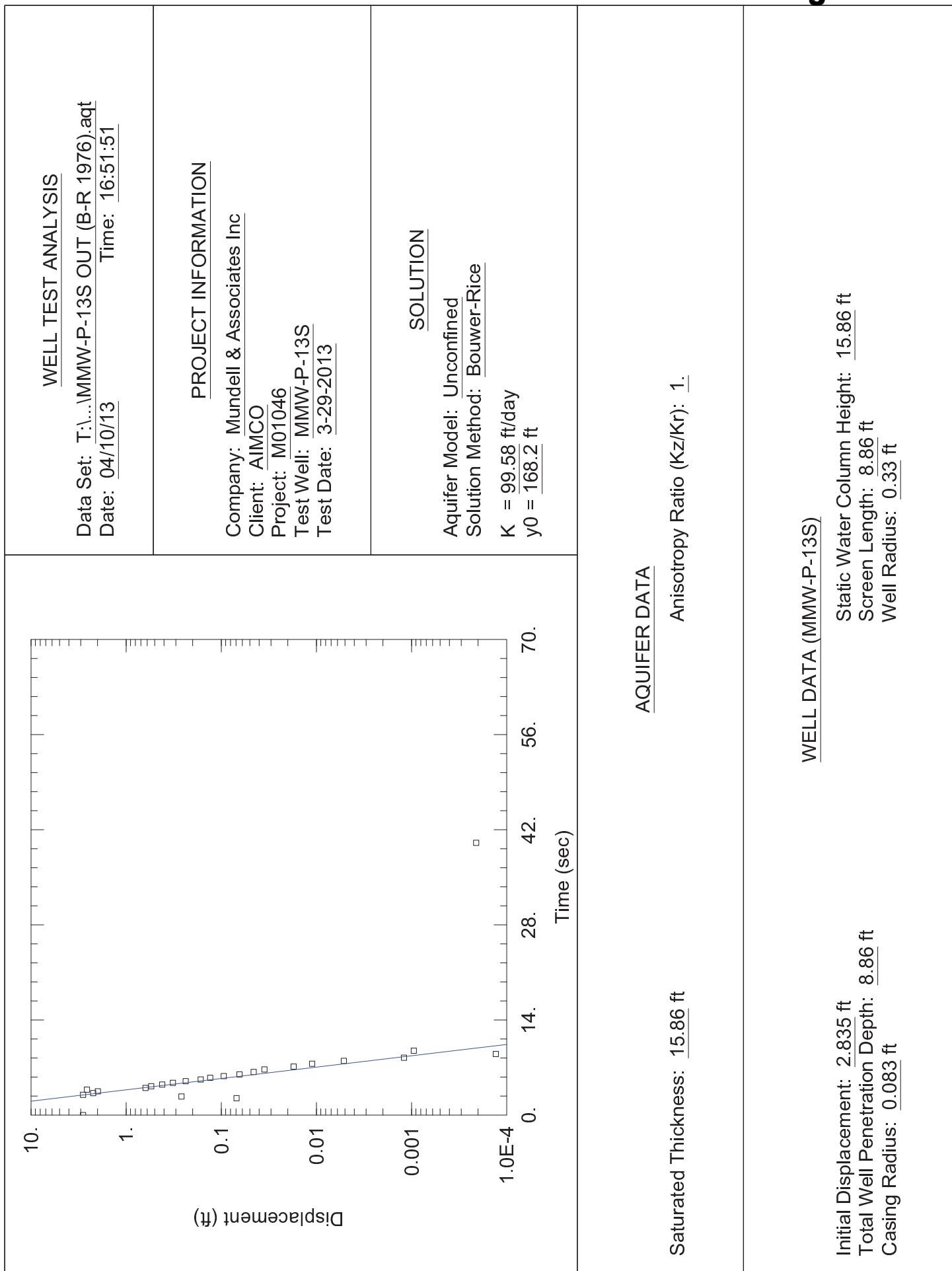
Slug Test
 Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 $\ln(Re/rw) = 2.151$

VISUAL ESTIMATION RESULTSEstimated Parameters

<u>Parameter</u>	<u>Estimate</u>
K	$\frac{57.4}{106.6}$ ft/day

$$K = 0.02025 \text{ cm/sec}$$

$$T = K^* b = 910.3 \text{ ft}^2/\text{day} (9.788 \text{ sq. cm/sec})$$



Data Set: T:\2001\M01046 Michigan Meadows Apts\Data\Slug Test Files\Slug Test 1976\MMW-P-13S OUT (B-R 1976).aqt
 Date: 04/10/13
 Time: 16:52:08

PROJECT INFORMATION

Company: Mundell & Associates Inc
 Client: AIMCO
 Project: M01046
 Test Date: 3-29-2013
 Test Well: MMW-P-13S

AQUIFER DATA

Saturated Thickness: 15.86 ft
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MMW-P-13S

X Location: 0. ft
 Y Location: 0. ft

Initial Displacement: 2.835 ft
 Static Water Column Height: 15.86 ft
 Casing Radius: 0.083 ft
 Well Radius: 0.33 ft
 Well Skin Radius: 0.33 ft
 Screen Length: 8.86 ft
 Total Well Penetration Depth: 8.86 ft

No. of Observations: 66

<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Observation Data</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>
0.251	-0.01421	5.751	0.0942	20.1	-0.006091	21.3	-0.01398
0.501	-0.01469	6.001	0.06438		-0.00693	22.56	-0.01119
0.751	-0.01446	6.361	0.04561		-0.005276	23.88	-0.004197
1.001	-0.01313	6.721	0.0352		-0.004197	25.32	-0.01299
1.251	-0.005877	7.141	0.01734		-0.01071	26.82	-0.002418
1.501	-0.01265	7.561	0.0111		-0.007493	28.38	-0.00087
1.751	-0.0123	7.981	0.00515		-0.003444	30.06	-0.00397
2.001	-0.0111	8.461	0.0012		-0.002493	31.86	-0.000209
2.251	-0.01134	9.001	0.00013			33.72	
2.501	0.06911	9.481	0.000947			35.76	
2.751	0.2622	10.08	0.001663			37.86	
3.001	2.835	10.68	-0.003444			40.08	
3.251	2.218	11.28	-0.002493				

AQTESOLV for Windows

<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>
3.501	1.983	11.94	-0.005137	42.48	-0.005523
3.751	2.578	12.66	-0.007643	45	-0.004571
4.001	0.6254	13.44	-0.004644	47.64	-0.00565
4.251	0.5441	14.22	-0.001929	50.46	-0.002308
4.501	0.4169	15.06	-0.002512	53.46	-0.007198
4.751	0.3226	15.96	-0.002982	56.64	-0.008738
5.001	0.2363	16.92	-0.003349	60	-0.005873
5.251	0.1643	17.88	-0.005877	63.65	-0.0123
5.501	0.1308	18.96	-0.004794	67.2	-0.008614

SOLUTION

Slug Test
 Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 $\ln(R_e/r_w) = 2.151$

VISUAL ESTIMATION RESULTSEstimated Parameters

<u>Parameter</u>	<u>Estimate</u>
K	99.58
y_0	168.2

$$K = 0.03513 \text{ cm/sec}$$

$$T = K^* b = 1579.3 \text{ ft}^2/\text{day} (16.98 \text{ sq. cm/sec})$$

WELL TEST ANALYSIS

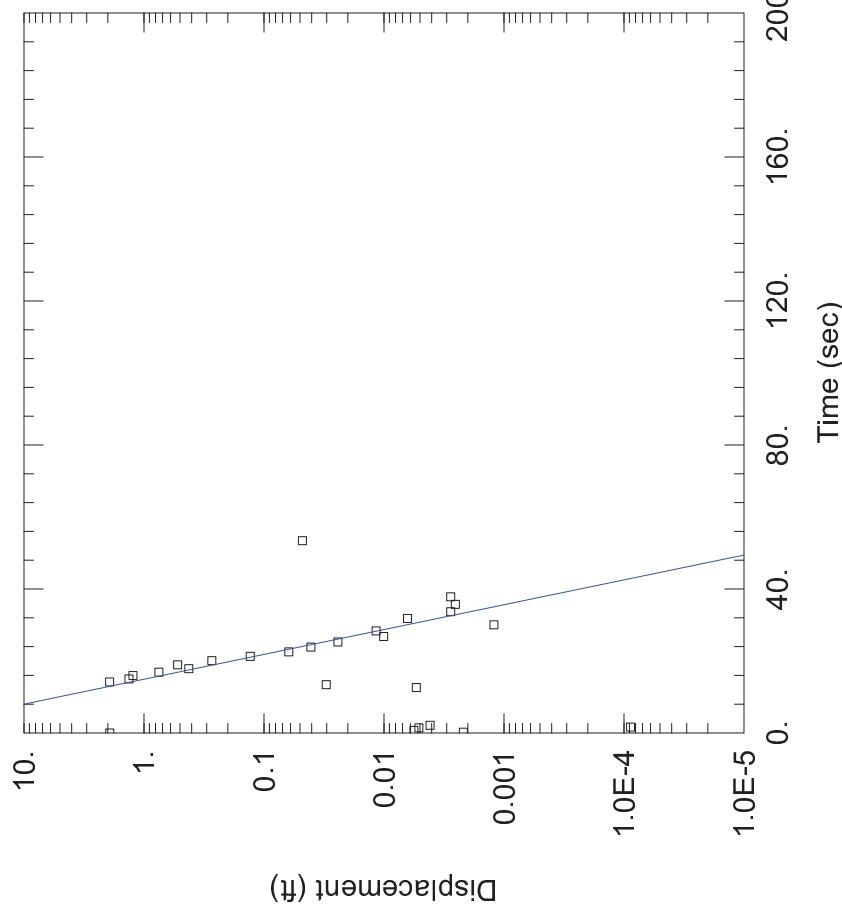
Data Set: T:\...\MMW-P-13D IN (B-R 1976).aqt
 Date: 04/10/13 Time: 16:47:13

PROJECT INFORMATION

Company: Mundell & Associates Inc.
 Client: AIMCO
 Project: M01046
 Test Well: MMW-P-13D
 Test Date: 3-29-2013

SOLUTION

Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 $K = 51.97 \text{ ft/day}$
 $y_0 = 145.9 \text{ ft}$

AQUIFER DATA

Anisotropy Ratio (K_z/K_r): 1.

Saturated Thickness: 16.1 ft

WELL DATA (MMW-P-13D)

Static Water Column Height: 16.1 ft
 Screen Length: 5 ft
 Well Radius: 0.33 ft

Initial Displacement: 1.929 ft
 Total Well Penetration Depth: 16.1 ft
 Casing Radius: 0.083 ft

Date: 04/10/13
Time: 16:47:40

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO
Project: M01046
Test Date: 3-29-2013
Test Well: MMW-P-13D

AQUIFER DATA

Saturated Thickness: 16.1 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MMW-P-13D

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 1.929 ft
Static Water Column Height: 16.1 ft
Casing Radius: 0.083 ft
Well Radius: 0.33 ft
Well Skin Radius: 0.33 ft
Screen Length: 5. ft
Total Well Penetration Depth: 16.1 ft

No. of Observations: 74

<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Observation Data</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>
0.251	0.00218	6.721	28.38	0.01162
0.501	-0.000709	-0.007077	30.06	0.001213
0.751	0.00562	-0.005754	31.86	0.006362
1.23	-0.000751	-0.007907	33.72	0.002779
1.451	0.005111	-0.01244	35.76	0.002541
1.671	8.8E-5	-0.01052	37.86	0.002779
2.166	0.004127	-0.01244	40.08	-0.005669
2.387	-5.3E-5	-0.01221	42.48	-0.01048
2.607	-0.002904	-0.009325	45.45	-0.00822
2.889	-0.007201	-0.004195	47.64	-0.002605
3.109	-0.006337	-0.01029	50.46	-0.009869
3.329	-0.007295	-0.01016	53.46	0.04782
3.549	-0.007529	0.005371	56.64	-0.005241
		0.03024		

AQTESOLV for Windows

<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>
3.769	-0.01029	14.22	1.929	60.	-0.01213
3.989	-0.004331	15.06	1.334	63.	-0.01358
4.209	-0.007201	15.96	1.235	67.	-0.0113
4.43	-0.008017	16.92	0.7503	71.	-0.01441
4.65	-0.005173	17.88	0.4228	75.	-0.01405
4.872	-0.006588	18.96	0.5238	79.	-0.0206
5.092	-0.005754	20.1	0.2713	84.	-0.01573
5.312	-0.006236	21.3	0.1302	90.	-0.01504
5.532	-0.009365	22.56	0.06195	94.	-0.01933
5.753	-0.003862	23.88	0.04065	100.	-0.0204
6.001	-0.007198	25.32	0.02418	106.	-0.02194
6.361	-0.007577	26.82	0.01006		

SOLUTION

Slug Test
 Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 $\ln(Re/rw) = 2.616$

VISUAL ESTIMATION RESULTSEstimated Parameters

<u>Parameter</u>	<u>Estimate</u>	
K	51.97	ft/day
y_0	145.9	ft

$$K = 0.01833 \text{ cm/sec}$$

$$T = K^* b = 836.8 \text{ ft}^2/\text{day} (8.997 \text{ sq. cm/sec})$$

WELL TEST ANALYSIS

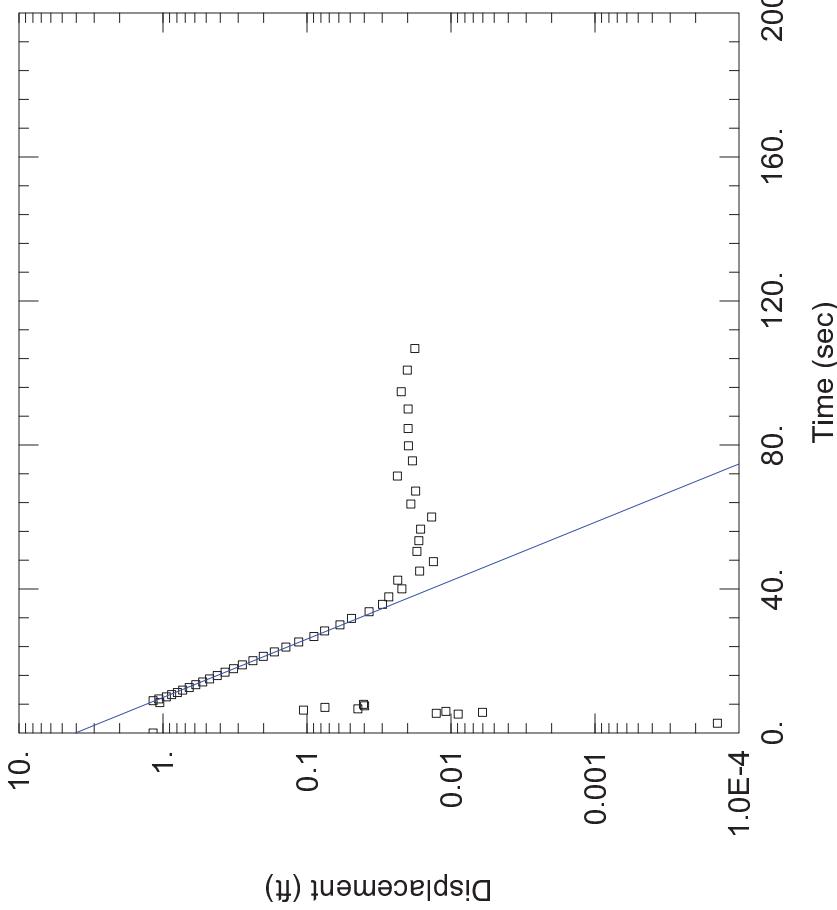
Data Set: T:\...\MMW-P-13D OUT (B-R 1976).aqt
 Date: 04/10/13 Time: 16:49:18

PROJECT INFORMATION

Company: Mundell & Associates Inc.
 Client: AIMCO
 Project: M01046
 Test Well: MMW-P-13D
 Test Date: 3-29-2013

SOLUTION

Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 $K = \frac{22.11}{4.053} \text{ ft/day}$
 $y_0 = 4.053 \text{ ft}$

AQUIFER DATA

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (MMW-P-13D)

Static Water Column Height: 16.1 ft
 Screen Length: 5 ft
 Well Radius: 0.33 ft

Saturated Thickness: 16.1 ft

Initial Displacement: 1.17 ft
 Total Well Penetration Depth: 16.1 ft
 Casing Radius: 0.083 ft

Date: 04/10/13
Time: 16:49:35PROJECT INFORMATION

Company: Mundell & Associates Inc.
 Client: AIMCO
 Project: M01046
 Test Date: 3-29-2013
 Test Well: MMW-P-13D

AQUIFER DATA

Saturated Thickness: 16.1 ft
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MMW-P-13D

X Location: 0. ft
 Y Location: 0. ft

Initial Displacement: 1.17 ft
 Static Water Column Height: 16.1 ft
 Casing Radius: 0.083 ft
 Well Radius: 0.33 ft
 Well Skin Radius: 0.33 ft
 Screen Length: 5. ft
 Total Well Penetration Depth: 16.1 ft

No. of Observations: 74

<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Observation Data</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>
0.251	-0.0005615	6.721	0.04432	28.38
0.501	-0.0005245	7.141	0.07505	30.06
0.751	-0.0008139	7.561	0.03976	31.86
1.001	-0.0008821	7.981	0.04047	33.72
1.251	-0.000739	8.461	1.052	35.76
1.501	-0.0007973	9.001	1.17	37.86
1.751	-0.0008335	9.481	1.068	40.08
2.001	-0.0003191	10.08	0.947	42.48
2.251	-0.000129	10.68	0.869	45.
2.501	-0.0005485	11.28	0.7928	47.64
2.751	0.000141	11.94	0.7288	50.46
3.001	-0.0005941	12.66	0.6572	53.46
3.251	-0.0005602	13.44	0.5912	56.64

AQTESOLV for Windows

<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>
3.501	-0.006078	14.22	0.5295	60.	0.01363
3.751	-0.004393	15.06	0.4745	63.	0.019
4.001	-0.009136	15.96	0.4201	67.2	0.01757
4.251	-0.00748	16.92	0.3698	71.4	0.02352
4.501	-0.004842	17.88	0.3228	75.6	0.01851
4.751	-0.005212	18.96	0.2806	79.8	0.01972
5.001	-0.001731	20.1	0.2369	84.6	0.01984
5.251	0.008912	21.3	0.2011	90.	0.01984
5.501	0.01263	22.56	0.1684	94.8	0.02211
5.751	0.006036	23.88	0.1399	100.8	0.02009
6.001	0.01083	25.32	0.1142	106.8	0.01782
6.36	0.1058	26.82	0.08953		

SOLUTION

Slug Test
 Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 $\ln(Re/rw) = 2.616$

VISUAL ESTIMATION RESULTSEstimated Parameters

<u>Parameter</u>	<u>Estimate</u>	<u>ft/day</u>
K	22.11	
y_0	4.053	ft

$$K = 0.0078 \text{ cm/sec}$$

$$T = K^* b = 356. \text{ ft}^2/\text{day} (3.828 \text{ sq. cm/sec})$$

WELL TEST ANALYSIS

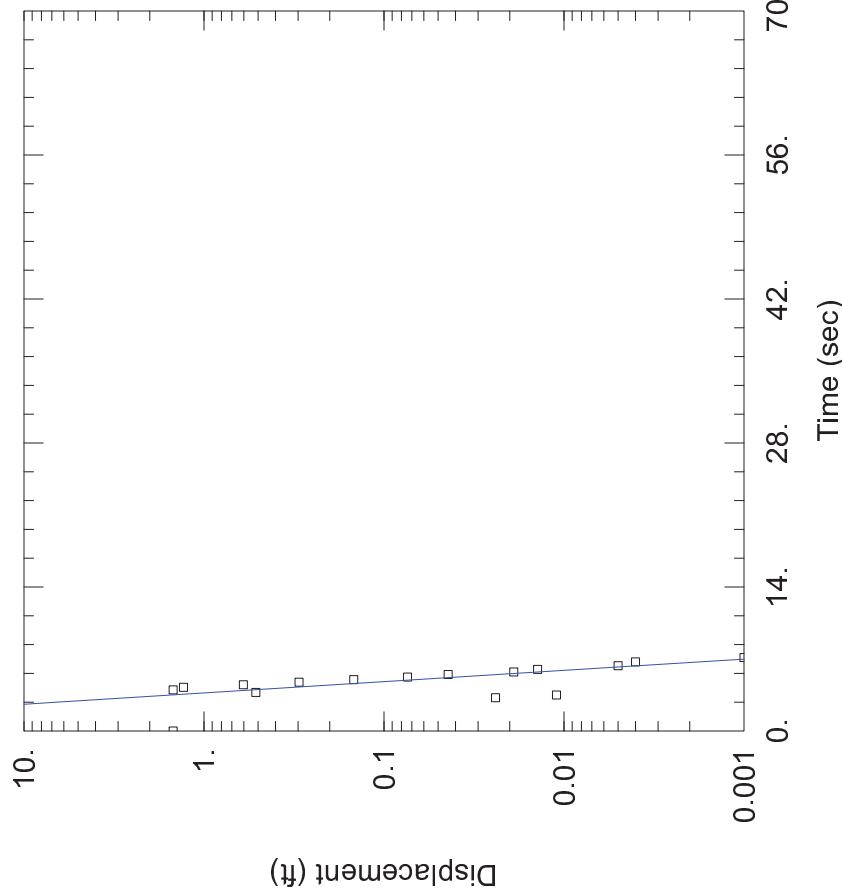
Data Set: T:\...\MMW-P-14S OUT (B-R 1976).aqt
 Date: 04/10/13 Time: 16:56:33

PROJECT INFORMATION

Company: Mundell & Associates Inc.
 Client: AIMCO
 Project: M01046
 Test Well: MMW-P-14S
 Test Date: 4-1-2013

SOLUTION

Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 $K = 141.1 \text{ ft/day}$
 $y_0 = 2352.1 \text{ ft}$

AQUIFER DATA

Anisotropy Ratio (K_z/K_r): 1.

Saturated Thickness: 17.89 ft

WELL DATA (MMW-P-14S)

Initial Displacement: 1.482 ft
 Total Well Penetration Depth: 9.89 ft
 Casing Radius: 0.083 ft
 Static Water Column Height: 17.89 ft
 Screen Length: 9.89 ft
 Well Radius: 0.33 ft

Data Set: T:\2001\M01046 Michigan Meadows Apts\Data\Slug Test Files\Slug Test 1976\MMW-P-14S OUT (B-R 1976).aqt
 Date: 04/10/13
 Time: 16:56:53

PROJECT INFORMATION

Company: Mundell & Associates Inc.
 Client: AIMCO
 Project: M01046
 Test Date: 4-1-2013
 Test Well: MMW-P-14S

AQUIFER DATA

Saturated Thickness: 17.89 ft
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MMW-P-14S

X Location: 0. ft
 Y Location: 0. ft

Initial Displacement: 1.482 ft
 Static Water Column Height: 17.89 ft
 Casing Radius: 0.083 ft
 Well Radius: 0.33 ft
 Well Skin Radius: 0.33 ft
 Screen Length: 9.89 ft
 Total Well Penetration Depth: 9.89 ft

No. of Observations: 66

Time (sec)	Displacement (ft)	Observation Data		Time (sec)	Displacement (ft)
		Time (sec)	Displacement (ft)		
0.251	-0.014	5.751	0.019	20.1	-0.015
0.501	-0.009	6.001	0.014	21.3	-0.023
0.751	-0.015	6.361	0.005	22.6	-0.021
1.001	-0.011	6.721	0.004	23.88	-0.025
1.251	-0.016	7.141	0.001	25.32	-0.026
1.501	-0.012	7.561	-0.007	26.82	-0.024
1.751	-0.013	7.981	-0.002	28.38	-0.022
2.001	-0.011	8.461	-0.01	30.06	-0.025
2.251	-0.008	9.001	-0.011	31.86	-0.021
2.501	-0.011	9.481	-0.012	33.72	-0.025
2.751	-0.01	10.08	-0.013	35.76	-0.023
3.001	-0.011	10.68	-0.012	37.86	-0.025
3.251	0.024	11.28	-0.013	40.08	-0.025

AQTESOLV for Windows

<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>
3.501	0.011	11.94	-0.015	42.48	-0.024
3.751	0.515	12.66	-0.019	45	-0.028
4.001	1.482	13.44	-0.018	47.64	-0.021
4.251	1.299	14.22	-0.017	50.46	-0.021
4.501	0.604	15.06	-0.033	53.46	-0.024
4.751	0.296	15.96	-0.034	56.64	-0.023
5.001	0.147	16.92	-0.031	60	-0.028
5.251	0.074	17.88	-0.005	63.6	-0.024
5.501	0.044	18.96	-0.021	67.2	-0.025

SOLUTION

Slug Test
 Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 $\ln(R_e/r_w) = 2.236$

VISUAL ESTIMATION RESULTSEstimated Parameters

<u>Parameter</u>	<u>Estimate</u>	<u>ft/day</u>
K	141.1	
y_0	2352.1	ft

$$K = 0.04979 \text{ cm/sec}$$

$$T = K^* b = 2524.9 \text{ ft}^2/\text{day} (27.15 \text{ sq. cm/sec})$$

WELL TEST ANALYSIS

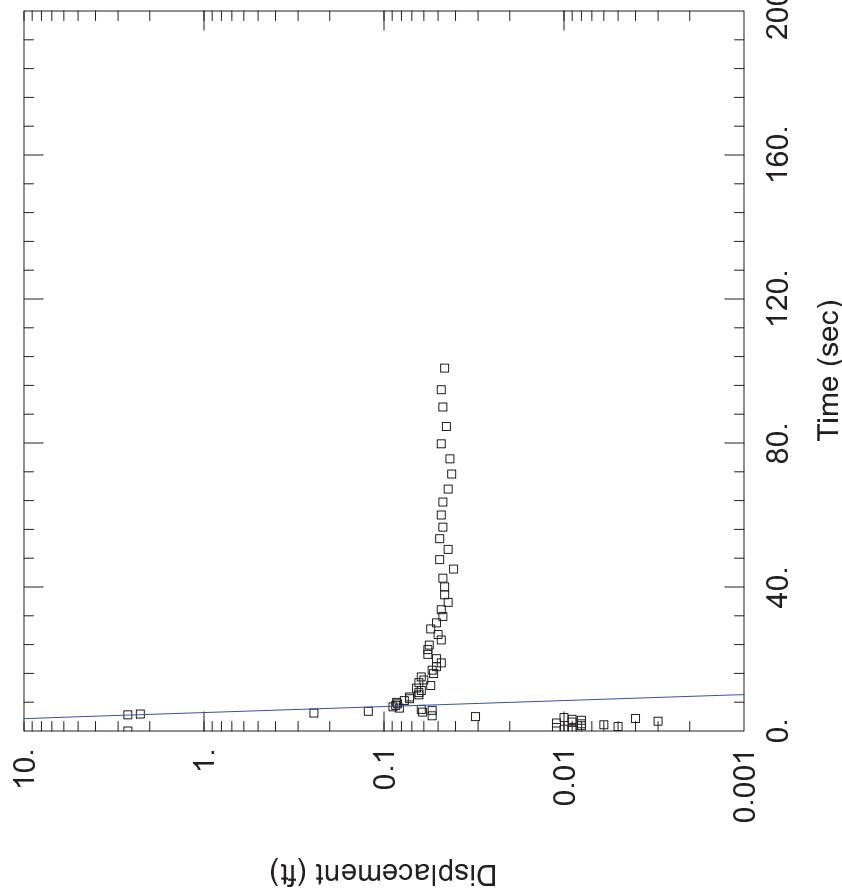
Data Set: T:\...\MMW-P-14S-2 IN (B-R 1976).aqt
 Date: 04/10/13 Time: 16:57:45

PROJECT INFORMATION

Company: Mundell & Associates Inc.
 Client: AIMCO
 Project: M01046
 Test Well: MMW-P-14S
 Test Date: 4-1-2013

SOLUTION

Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 $K = \frac{92.96}{y_0} \text{ ft/day}$
 $y_0 = 1186 \text{ ft}$

AQUIFER DATA

Anisotropy Ratio (K_z/K_r): 1.

WELL DATA (MMW-P-14S)

Initial Displacement: 2.647 ft
 Total Well Penetration Depth: 9.89 ft
 Casing Radius: 0.083 ft
 Static Water Column Height: 17.89 ft
 Screen Length: 9.89 ft
 Well Radius: 0.33 ft

Data Set: T:\2001\M01046 Michigan Meadows Apts\Data\Slug Test Files\Slug Test 1976\MMW-P-14S-2 IN (B-R 1976).aqt
 Date: 04/10/13
 Time: 16:58:09

PROJECT INFORMATION

Company: Mundell & Associates Inc.
 Client: AIMCO
 Project: M01046
 Test Date: 4-1-2013
 Test Well: MMW-P-14S

AQUIFER DATA

Saturated Thickness: 17.89 ft
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MMW-P-14S

X Location: 0. ft
 Y Location: 0. ft

Initial Displacement: 2.647 ft
 Static Water Column Height: 17.89 ft
 Casing Radius: 0.083 ft
 Well Radius: 0.33 ft
 Well Skin Radius: 0.33 ft
 Screen Length: 9.89 ft
 Total Well Penetration Depth: 9.89 ft

No. of Observations: 73

<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Observation Data</u>		<u>Time (sec)</u>	<u>Displacement (ft)</u>
		<u>Time (sec)</u>	<u>Displacement (ft)</u>		
0.251	0.009	6.721	0.089	28.38	0.055
0.501	0.01	7.141	0.086	30.06	0.051
0.751	0.009	7.561	0.084	31.86	0.047
1.001	0.011	7.981	0.085	33.72	0.048
1.251	0.005	8.461	0.077	35.76	0.044
1.501	0.008	8.9	0.072	37.86	0.046
1.751	0.006	9.48	0.072	40.08	0.046
2.001	0.008	10.08	0.064	42.48	0.047
2.251	0.011	10.69	0.064	45.	0.041
2.501	0.009	11.28	0.062	47.64	0.049
2.751	0.003	11.94	0.066	50.46	0.044
3.001	0.008	12.66	0.055	53.46	0.049
3.251	0.009	13.44	0.064	56.64	0.047

AQTESOLV for Windows

<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>
3.501	0.004	14.22	0.06	60.	0.048
3.751	0.01	15.06	0.062	63.6	0.047
4.001	0.031	15.96	0.053	67.2	0.044
4.251	0.054	16.92	0.054	71.4	0.042
4.501	2.647	17.88	0.051	75.6	0.043
4.751	2.255	18.96	0.048	79.8	0.048
5.001	0.245	20.1	0.051	84.6	0.045
5.251	0.061	21.3	0.057	90.	0.047
5.501	0.122	22.65	0.057	94.8	0.048
5.751	0.054	23.88	0.056	100.8	0.046
6.001	0.062	25.32	0.048		
6.361	0.082	26.82	0.05		

SOLUTION

Slug Test
 Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 $\ln(Re/rw) = 2.236$

VISUAL ESTIMATION RESULTSEstimated Parameters

<u>Parameter</u>	<u>Estimate</u>	<u>ft/day</u>
K	92.96	
y_0	1186.	ft

$$K = 0.03279 \text{ cm/sec}$$

$$T = K^* b = 1663.1 \text{ ft}^2/\text{day} (17.88 \text{ sq. cm/sec})$$

WELL TEST ANALYSIS

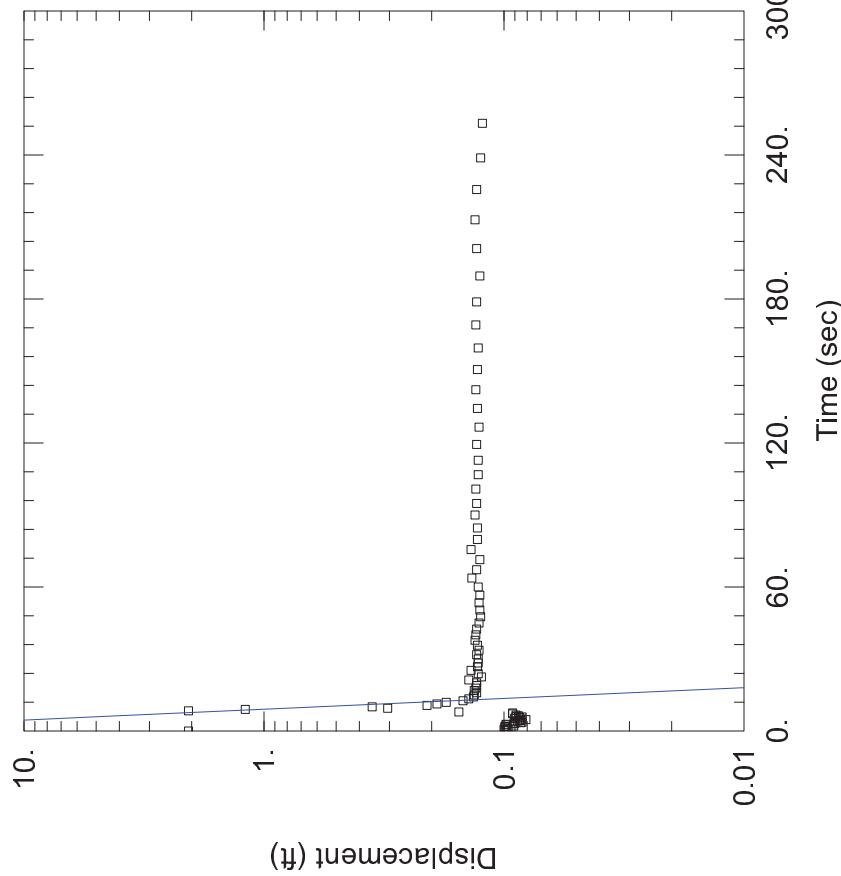
Data Set: T:\...\MMW-P-14D IN (B-R 1976).aqt
 Date: 04/10/13 Time: 16:53:52

PROJECT INFORMATION

Company: Mundell & Associates Inc.
 Client: AIMCO
 Project: M01046
 Test Well: MMW-P-14D
 Test Date: 4-1-2013

SOLUTION

Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 $K = 67.13 \text{ ft/day}$
 $y_0 = \frac{104.9}{104.9} \text{ ft}$

AQUIFER DATA

Anisotropy Ratio (K_z/K_r): 1.

Saturated Thickness: 17.61 ft

WELL DATA (MMW-P-14D)

Initial Displacement: 2.061 ft
 Total Well Penetration Depth: 15.61 ft
 Casing Radius: 0.083 ft
 Static Water Column Height: 17.61 ft
 Screen Length: 5 ft
 Well Radius: 0.33 ft

PROJECT INFORMATION

Company: Mundell & Associates Inc.
 Client: AIMCO
 Project: M01046
 Test Date: 4-1-2013
 Test Well: MMW-P-14D

AQUIFER DATA

Saturated Thickness: 17.61 ft
 Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MMW-P-14D

X Location: 0. ft
 Y Location: 0. ft

Initial Displacement: 2.061 ft
 Static Water Column Height: 17.61 ft
 Casing Radius: 0.083 ft
 Well Radius: 0.33 ft
 Well Skin Radius: 0.33 ft
 Screen Length: 5. ft
 Total Well Penetration Depth: 15.61 ft

No. of Observations: 89

<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Observation Data</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>
0.251	0.098	9.001	1.195	50.46	50.46	0.126
0.729	0.1	9.481	0.305	53.46	53.46	0.127
0.95	0.097	10.08	0.354	56.64	56.64	0.126
1.171	0.096	10.68	0.209	60.	60.	0.128
1.662	0.099	11.28	0.19	63.74	63.74	0.136
1.883	0.099	11.94	0.174	67.2	67.2	0.13
2.106	0.091	12.66	0.148	71.4	71.4	0.126
2.591	0.098	13.44	0.14	75.6	75.6	0.137
2.812	0.098	14.22	0.134	79.8	79.8	0.129
3.032	0.091	15.06	0.133	84.6	84.6	0.132
3.255	0.09	15.96	0.13	90.	90.	0.132
3.475	0.085	16.92	0.133	94.8	94.8	0.13
3.696	0.084	17.88	0.131	100.8	100.8	0.131

AQTESOLV for Windows

<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>
3.917	0.09	18.96	0.13	106.8	0.128
4.137	0.088	20.1	0.13	112.8	0.128
4.358	0.086	21.32	0.14	119.4	0.13
4.578	0.085	22.56	0.124	126.6	0.127
4.798	0.081	23.88	0.128	134.4	0.129
5.02	0.084	25.32	0.137	142.2	0.131
5.24	0.09	26.82	0.129	150.6	0.129
5.46	0.09	28.38	0.128	159.6	0.128
5.681	0.086	30.06	0.128	169.2	0.131
5.902	0.084	31.86	0.13	178.8	0.13
6.122	0.089	33.72	0.127	189.6	0.126
6.36	0.087	35.76	0.129	201.	0.13
6.721	0.089	37.86	0.132	213.	0.132
7.14	0.092	40.08	0.131	225.6	0.13
7.56	0.092	42.48	0.13	238.8	0.125
7.98	0.154	45.	0.127	253.2	0.125
8.461	2.061	47.64	0.125		

SOLUTION

Slug Test
 Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 In(Re/rw): 2.199

VISUAL ESTIMATION RESULTSEstimated Parameters

<u>Parameter</u>	<u>Estimate</u>
K	67.13 ft/day
y_0	104.9 ft

$$K = 0.02368 \text{ cm/sec}$$

$$\frac{T}{T} = K^* b = 1182.2 \text{ ft}^2/\text{day} (12.71 \text{ sq. cm/sec})$$

WELL TEST ANALYSIS

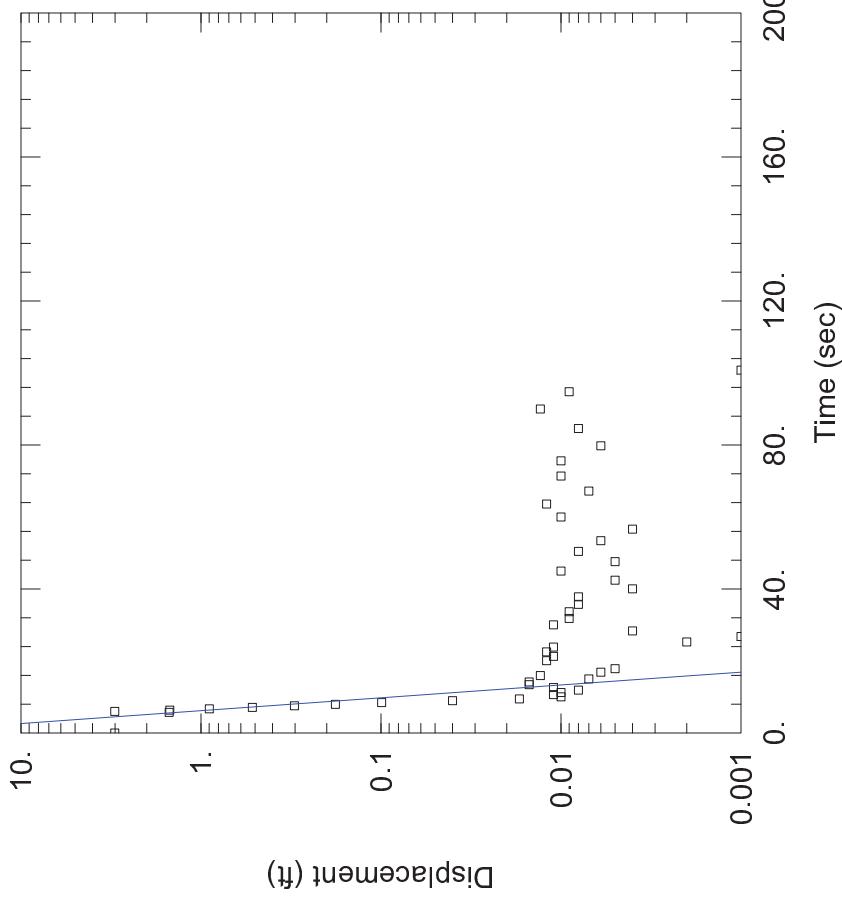
Data Set: T:\...\MMW-P-14D OUT (B-R 1976).aqt
 Date: 04/10/13 Time: 16:55:19

PROJECT INFORMATION

Company: Mundell & Associates Inc.
 Client: AIMCO
 Project: M01046
 Test Well: MMW-P-14D
 Test Date: 4-1-2013

SOLUTION

Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 $K = \frac{84.4}{54.51} \text{ ft/day}$
 $y_0 = 54.51 \text{ ft}$

AQUIFER DATA

Anisotropy Ratio (K_z/K_r): 1.

Saturated Thickness: 17.61 ft

WELL DATA (MMW-P-14D)

Initial Displacement: 3.008 ft
 Total Well Penetration Depth: 15.61 ft
 Casing Radius: 0.083 ft

Static Water Column Height: 17.61 ft
 Screen Length: 5 ft
 Well Radius: 0.33 ft

Date: 04/10/13
Time: 16:55:37

PROJECT INFORMATION

Company: Mundell & Associates Inc.
Client: AIMCO
Project: M01046
Test Date: 4-1-2013
Test Well: MMW-P-14D

AQUIFER DATA

Saturated Thickness: 17.61 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MMW-P-14D

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 3.008 ft
Static Water Column Height: 17.61 ft
Casing Radius: 0.083 ft
Well Radius: 0.33 ft
Well Skin Radius: 0.33 ft
Screen Length: 5. ft
Total Well Penetration Depth: 15.61 ft

No. of Observations: 73

Time (sec)	Displacement (ft)	Observation Data		Time (sec)	Displacement (ft)
		Time (sec)	Displacement (ft)		
0.251	-0.01	6.721	0.898	28.38	0.004
0.501	-0.007	7.141	0.518	30.06	0.011
0.751	-0.008	7.561	0.302	31.86	0.009
1.001	-0.011	7.981	0.179	33.72	0.009
1.251	-0.011	8.461	0.099	35.76	0.008
1.501	-0.011	9.001	0.04	37.86	0.008
1.751	-0.01	9.481	0.017	40.08	0.004
2.001	-0.009	10.08	0.01	42.48	0.005
2.251	-0.016	10.68	0.011	45.45	0.01
2.501	-0.012	11.28	0.01	47.64	0.005
2.751	-0.01	11.94	0.008	50.46	0.008
3.001	-0.008	12.66	0.011	53.46	0.006
3.251	-0.009	13.44	0.015	56.64	0.004

AQTESOLV for Windows

<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>	<u>Time (sec)</u>	<u>Displacement (ft)</u>
3.501	-0.009	14.22	0.015	60.	0.01
3.751	-0.009	15.06	0.007	63.6	0.012
4.001	-0.008	15.96	0.013	67.2	0.007
4.251	-0.009	16.92	0.006	71.4	0.01
4.501	-0.011	17.88	0.005	75.6	0.01
4.751	-0.008	18.96	-0.001	79.8	0.006
5.001	-0.004	20.1	0.012	84.6	0.008
5.251	-0.008	21.3	0.011	90.	0.013
5.501	-0.006	22.56	0.012	94.8	0.009
5.751	1.5	23.88	0.011		0.001
6.001	3.008	25.32	0.002		
6.361	1.489	26.82	0.001		

SOLUTION

Slug Test
 Aquifer Model: Unconfined
 Solution Method: Bouwer-Rice
 $\ln(Re/rw) = 2.199$

VISUAL ESTIMATION RESULTSEstimated Parameters

<u>Parameter</u>	<u>Estimate</u>	
K	84.4	ft/day
y_0	54.51	ft

$$K = 0.02977 \text{ cm/sec}$$

$$T = K^* b = 1486.2 \text{ ft}^2/\text{day} (15.98 \text{ sq. cm/sec})$$

WELL TEST ANALYSIS

Data Set: T:\...\OW 10 ft S = 0.1 Rate=3 GPM Recovery at 10 hrs
 Date: 04/10/13 Time: 17:05:36

PROJECT INFORMATION

Company: Mundell & Associates Inc.
 Client: AIMCO

SOLUTION

Aquifer Model: Unconfined

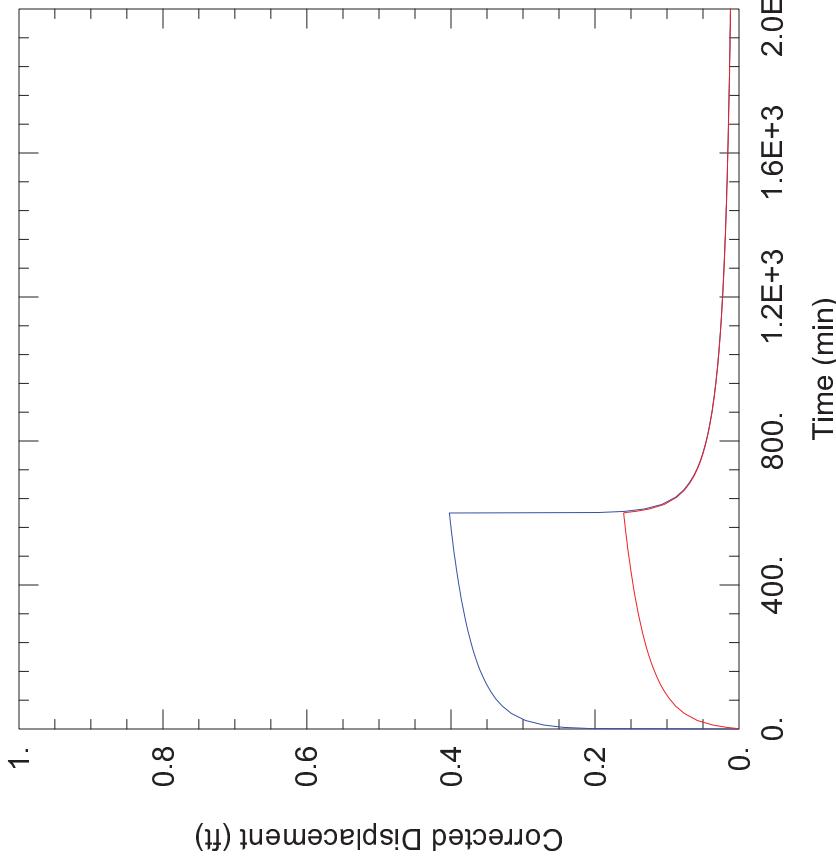
Solution Method: Theis

$$T = 1400 \text{ ft}^2/\text{day}$$

$$S = 0.1$$

$$Kz/Kr = 1.$$

$$b = 20. \text{ ft}$$

OBSERVATION WELLS

Well Name	X (ft)	Y (ft)
PW	0	0
OW	10	0

WELL TEST ANALYSIS

Data Set: T:\...\OW 10 ft S = 0.1 Rate=3 GPM Recovery at 10 hrs
 Date: 04/10/13 Time: 17:06:04

PROJECT INFORMATION

Company: Mundell & Associates Inc.
 Client: AIMCO

SOLUTION

Aquifer Model: Unconfined

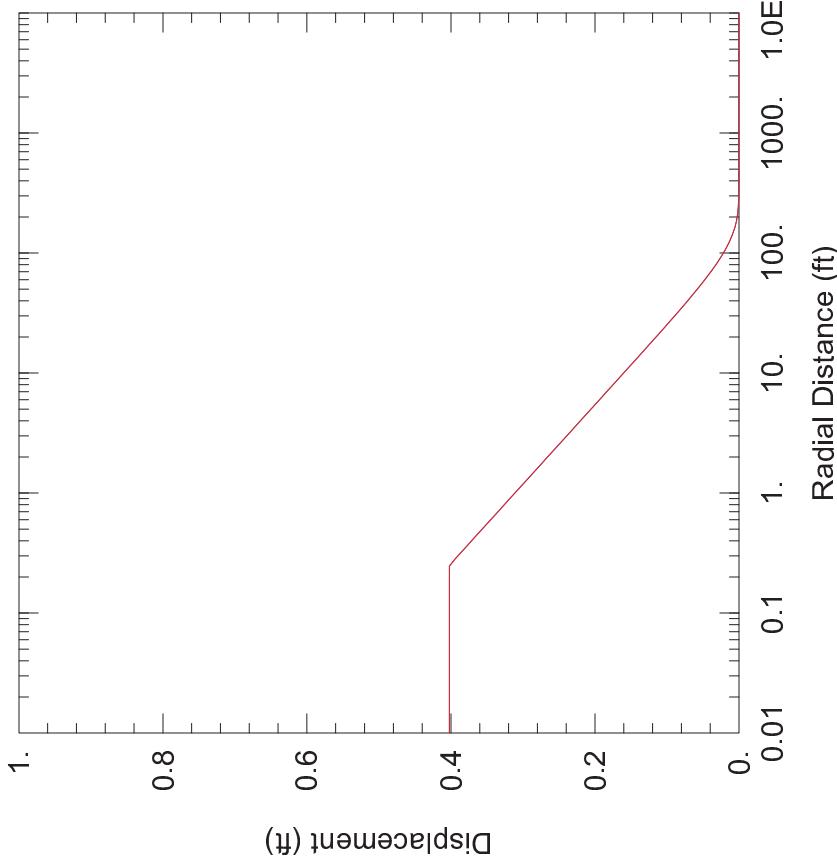
Solution Method: Theis

$$T = 1400 \text{ ft}^2/\text{day}$$

$$S = 0.1$$

$$Kz/Kr = 1.$$

$$b = 20. \text{ ft}$$

OBSERVATION WELLS

Well Name	X (ft)	Y (ft)	Z (ft)
PW	0	0	0
OW	10	0	0

WELL DATAPUMPING WELLS

Well Name	X (ft)	Y (ft)
PW	0	0

PROJECT INFORMATIONCompany: Mundell & Associates Inc.
Client: AIMCOAQUIFER DATASaturated Thickness: 20. ft
Anisotropy Ratio (Kz/Kr): 1.PUMPING WELL DATA

No. of pumping wells: 1

Pumping Well No. 1: PWX Location: 0. ft
Y Location: 0. ftCasing Radius: 0.1 ft
Well Radius: 0.25 ft

Fully Penetrating Well

No. of pumping periods: 2

Time (min)	Rate (gal/min)	Pumping Period Data	Time (min)	Rate (gal/min)
0.			600.	

OBSERVATION WELL DATA

No. of observation wells: 2

Observation Well No. 1: PWX Location: 0. ft
Y Location: 0. ft

Radial distance from PW: 0. ft

Fully Penetrating Well

No. of Observations: 0

AQTESOLV for WindowsObservation Well No. 2: OW

X Location: 10. ft
 Y Location: 0. ft

Radial distance from PW: 10. ft

Fully Penetrating Well

No. of Observations: 0

SOLUTION

Pumping Test
 Aquifer Model: Unconfined
 Solution Method: Theis

VISUAL ESTIMATION RESULTSEstimated Parameters

<u>Parameter</u>	<u>Estimate</u>	<u>ft²/day</u>
S	1400.	
Kz/Kr	0.1	
b	1.	
	20.	ft

$$K = T/b = 70. \text{ ft/day} (0.02469 \text{ cm/sec})$$

$$S_s = S/b = 0.005 \text{ 1/ft}$$

WELL TEST ANALYSIS

Data Set: T:\...\OW 10 ft S = 0.3 Rate=3 GPM Recovery at 10 hrs
 Date: 04/10/13 Time: 17:06:26

PROJECT INFORMATION

Company: Mundell & Associates Inc.
 Client: AIMCO

SOLUTION

Aquifer Model: Unconfined

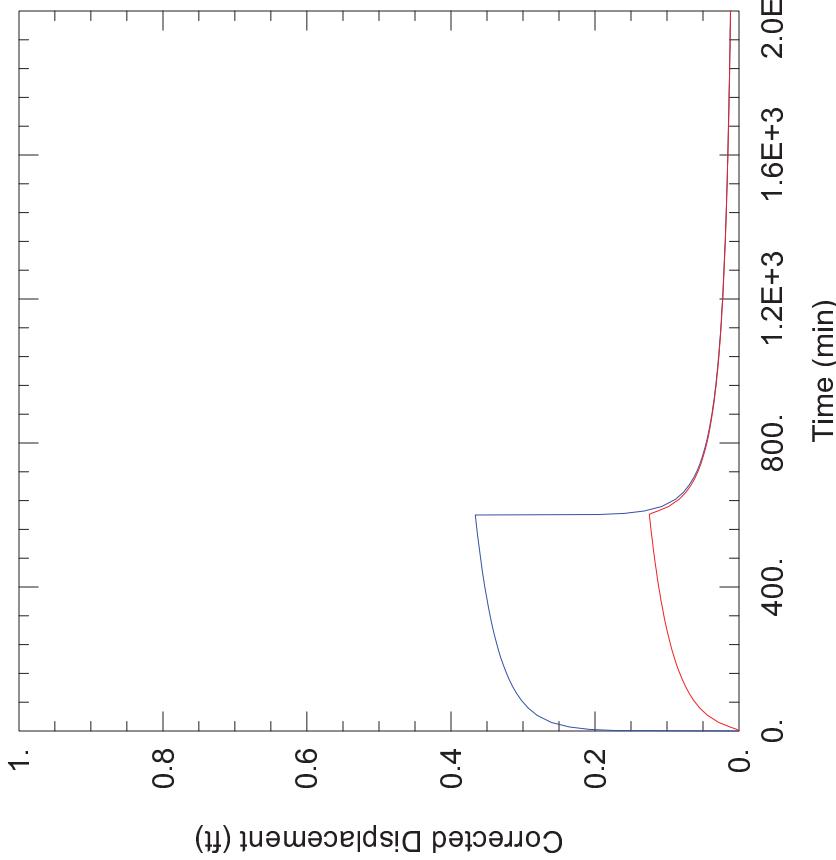
Solution Method: Theis

$$T = 1400 \text{ ft}^2/\text{day}$$

$$S = 0.3$$

$$Kz/Kr = 1.$$

$$b = 20. \text{ ft}$$

OBSERVATION WELLS

Well Name	X (ft)	Y (ft)	Z (ft)
PW	0	0	0
OW	10	0	0

WELL DATAPUMPING WELLS

Well Name	X (ft)	Y (ft)	Z (ft)
PW	0	0	0

WELL TEST ANALYSIS

Data Set: T:\...\OW 10 ft S = 0.3 Rate=3 GPM Recovery at 10 hrs
 Date: 04/10/13 Time: 17:06:43

PROJECT INFORMATION

Company: Mundell & Associates Inc.
 Client: AIMCO

SOLUTION

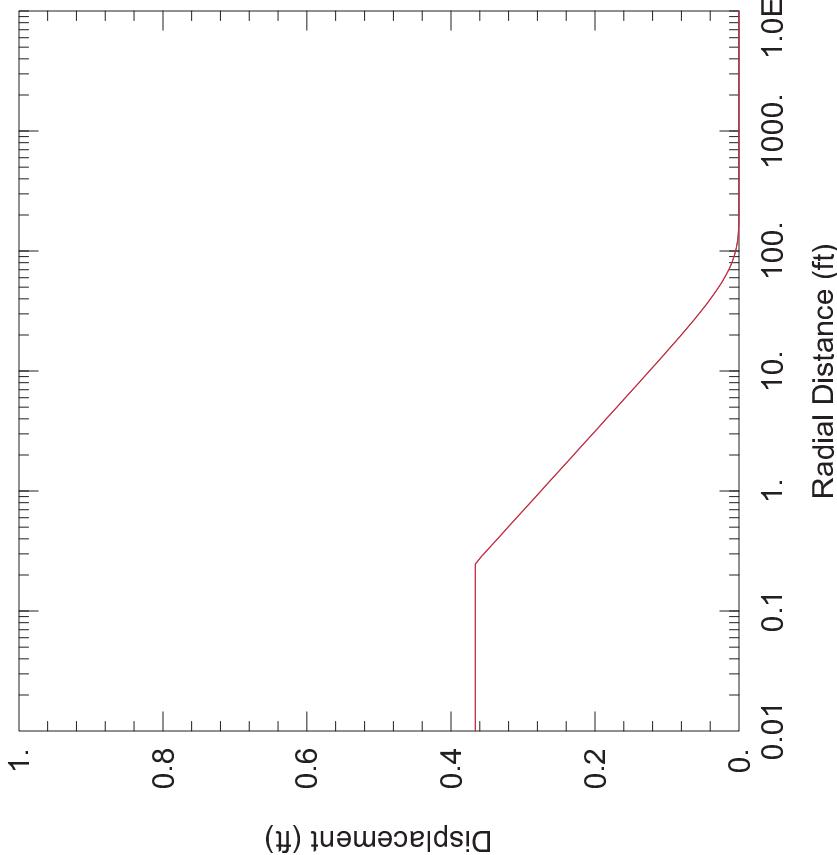
Aquifer Model: Unconfined

Solution Method: Theis

$$T = 1400 \text{ ft}^2/\text{day}$$

$$S = \frac{0.3}{Kz/Kr} = \frac{1}{20}$$

$$b = 20 \text{ ft}$$

OBSERVATION WELLS

Well Name	X (ft)	Y (ft)	Z (ft)
PW	0	0	0
OW	10	0	0

PUMPING WELLS

Well Name	X (ft)	Y (ft)
PW	0	0

PROJECT INFORMATIONCompany: Mundell & Associates Inc.
Client: AIMCOAQUIFER DATASaturated Thickness: 20. ft
Anisotropy Ratio (Kz/Kr): 1.PUMPING WELL DATA

No. of pumping wells: 1

Pumping Well No. 1: PWX Location: 0. ft
Y Location: 0. ftCasing Radius: 0.1 ft
Well Radius: 0.25 ft

Fully Penetrating Well

No. of pumping periods: 2

Time (min)	Rate (gal/min)	Pumping Period Data	Time (min)	Rate (gal/min)
0.			600.	

OBSERVATION WELL DATA

No. of observation wells: 2

Observation Well No. 1: PWX Location: 0. ft
Y Location: 0. ft

Radial distance from PW: 0. ft

Fully Penetrating Well

No. of Observations: 0

AQTESOLV for WindowsObservation Well No. 2: OW

X Location: 10. ft
 Y Location: 0. ft

Radial distance from PW: 10. ft

Fully Penetrating Well

No. of Observations: 0

SOLUTION

Pumping Test
 Aquifer Model: Unconfined
 Solution Method: Theis

VISUAL ESTIMATION RESULTSEstimated Parameters

<u>Parameter</u>	<u>Estimate</u>	
S	1400.	ft^2/day
Kz/Kr	0.3	
b	1.	
	20.	ft

$$K = T/b = 70. \text{ ft/day} (0.02469 \text{ cm/sec})$$

$$S_s = S/b = 0.015 \text{ 1/ft}$$